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ABSTRACT

THE PURPOSE OF THIS STUDY WAS TO IDENTIFY CHARACTERISTICS WHICH DESCRIBE HIGH SCHOOL DROPOUTS. THE INVESTIGATION ATTEMPTED TO IDENTIFY VARIABLES WHICH WOULD ASSIST IN DIFFERENTIATING PERSISTERS AND WITHDRAWALS AT NORTHEAST HIGH SCHOOL IN KANSAS CITY, MISSOURI AND IN PREDICTING DROPOUTS AT EAST HIGH SCHOOL ON THE BASIS OF VARIABLE WEIGHTINGS DRAWN FROM THE POPULATION AT NORTHEAST HIGH. THE SAMPLE CONSISTED OF 866 STUDENTS FROM NORTHEAST HIGH SCHOOL AND 269 STUDENTS FROM EAST HIGH SCHOOL. THIRTY-THREE CHARACTERISTICS WERE SELECTED FROM A REVIEW OF THE LITERATURE AS BEING RELATED TO HIGH SCHOOL WITHDRAWAL AND AN INDIVIDUAL DISCRIMINATION FUNCTION COEFFICIENT WAS ASCERTAINED FOR EACH OF THE VARIABLES. IN THIS WAY EACH STUDENT WAS ASSIGNED TO THE GROUP HE MOST RESEMBLED--DROPOUT OR PERSISTER. THESE GROUPS WERE SUBDIVIDED AND SIGNIFICANT DIFFERENCES WERE ACHIEVED FOR DROPOUTS AND PERSISTERS IN ALL 32 GROUPS IN THE NORTHEAST POPULATION, AND IN THE CROSS-VALIDATION PROCESS DIFFERENCES WERE SIGNIFICANT FOR THE TOTAL STUDENT GROUP AND FOR MALES. IT WAS DEMONSTRATED THAT SCHOOL DROPOUTS CAN BE PREDICTED AT A HIGH LEVEL OF ACCURACY BY USE OF MULTIPLE DISCRIMINATION ANALYSIS AND THAT CHARACTERISTICS OF DROPOUTS FROM ONE HIGH SCHOOL MAY BE USED TO PREDICT DROPOUTS AT ANOTHER HIGH SCHOOL WITH VARYING DEGREES OF ACCURACY. RECOMMENDATIONS FOR FUTURE STUDIES ARE DISCUSSED. (RSM)

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Warrensburg, Missouri

August 31, 1969

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SUMMARY

The purpose of this study was to identify characteristics which described high school students who withdrew from school. In addition, this investigation attempted to predict school dropouts at one school in Kansas City, Missouri, on the basis of variable weightings drawn from a different school. The original two-year population consisted of 866 students from Northeast High School; for cross-validation, characteristics of 269 students from East High School were examined. Persisters were selected randomly, by school class.

A stepwise program of multiple discriminant analysis utilized the F-level test of significance to determine the order of importance of variables when the students were grouped into different categories. Characteristics selected from a review of the literature as being related to high school withdrawal included student's age; birth order; father's occupation; student ratings by the teacher; grade averages; quartile rank; IQ scores; achievement test scores; number of tardies; number of absences; number of retentions; and school transfers. Of 33 variables programed in this study, teacher ratings and student age appeared most often. Variables were never added in identical order for different categories.

Through discriminant analysis, the student population was classified into one of two groups--dropout or persister. The chi-square test of significance was used and accuracy percentages were computed. Differences significant beyond the 0.001 level were achieved for all 32 groups in the first two-year population. In the process of cross-validation, differences between dropouts and persisters were significant beyond the 0.001 level for the total student group and for males.

Dropout prediction percentages for 22 of 32 groups were 90 or above. Seventy-seven dropouts, or 100 percent of the male withdrawals from East High School, were predicted accurately through cross-validation on the basis of characteristics derived from school dropouts from Northeast High School. Total accuracy of prediction for males by the process of cross-validation was 92.5 percent. For all 269 students the total predictive accuracy was 88.8 percent, and the accuracy for dropouts was 91.2 percent.

CHAPTER I

INTRODUCTION

Some twenty-six million students will leave school to enter the world of work between 1960 and 1970. It is predicted that about seven and one-half million will be school dropouts, and some two and one-half million of these students will have had less than eight years of formal education (34:3). Of the total dropouts, an estimated 71 percent have sufficient ability to finish college or vocational programs, and some 20 to 25 percent of school withdrawals have superior intelligence suggesting that causes of withdrawal are often economic or social (35).

The school dropout rate is not rising. In fact, there has been a steady decrease in the number of dropouts and an even greater decline in the rate of withdrawal. The problem is becoming more troublesome because of several factors.

There is a high, and seemingly almost constant, rate of unemployment (36:114). Although youth under 25 represent only one-fifth of the total labor force, they account for one-third of the unemployed. The teenage unemployment rate may run two and one-half to three times the rate for persons over age 25. The real problem today is that there is less demand for the kinds of work that dropouts can do. School withdrawals are generally employed in occupations which have the highest unemployment rate or the least potential for growth and development. The proportion of high school dropouts in the labor force has dropped below the 50 percent mark, but studies have shown that some 50 percent of high school dropouts are still unemployed a year after withdrawal. When the dropout is employed he can expect to work in a lower-skill category and to earn less than the graduate.

The population explosion increases the emphasis on youth in the population. In 1965 over a million more youth reached 18 than had attained that age in 1964 ([illegible]).

The movement from rural and farm areas to urban centers has increased the problem of the dropout--and his employment. On the farm, the high school dropout was an economic asset. As more youth enter the cities seeking jobs, unemployment figures rise, and he becomes an economic liability.

More attention is focused on the school dropout as the number of families on welfare increases, particularly in the larger cities. The cost of public assistance is also rising along with public concern for the school withdrawal.

Racial riots in the cities, in which the rioters are overwhelmingly unemployed youths, call attention to attrition. There is an increased need for understanding of youth today and its problems.

An elimination of unskilled jobs through automation and technological change is taking place. A greater gap is present between the dropout's educational level and the level demanded by industry. There are fewer jobs available for the unskilled worker. Today only 17 percent of the jobs available are in an unskilled area (39:2-3). Predictions indicate a decrease to five percent by 1970. In direct contrast, job opportunities in the professions and technical areas will increase by some 40 percent.

Not only are there large losses in human resources to business and industry, but also there are losses to the student himself. The youth loses possible future income. He may feel isolated, unworthy, a failure. The school dropout has failed in one of the most important demands of the American culture--a formal education.

The goal of public education is free education for all youth through high school. In practice, statistics indicate that some 29 percent of the potential high school graduates of 1965 withdrew prior to graduation (34:46). There appears to be no place in our society for many of these youth--no place in school and no job outside of school. Schools must offer the potential dropout an opportunity for greater success within school to lessen his reasons for withdrawal.

Although the rate of attrition may best be curtailed by giving more attention to the concerns of the dropout and to the causes of withdrawal, the solution to the problem still demands better, more accurate prediction. More data about attrition in general and the characteristics which may predict withdrawal, in particular, are necessary in order to plan alleviation.

Identification of school dropouts is difficult through any systematic study of pupil characteristics because there is great variability in dropouts themselves. Nevertheless, before school retention statistics are altered there must be some means of identifying dropouts. Data describing the characteristics which will identify withdrawals are available in a large number of schools, and most of these data are available at the elementary level although dropout symptoms are often magnified as a result of continued lack of success and increasing academic demands as the child progresses through school.

The main objective of this study is to determine whether biographical and personality data differentiate students who remain in high school and those who drop out. The student characteristics listed are amenable to quantification and will serve as the predictor variables for the study. It is generally recognized that a composite score made up of several variables will frequently be more effective in either classification or prediction than a single predictor alone. This study, then, will be devoted to the determination of a composite of predictors that is maximumly effective in the discrimination between student persisters and dropouts. Multiple discriminant analysis is ideally suited for this purpose because it permits the investigator to examine the discriminatory efficiency of different combinations of variables. This technique also provides weights for each variable in each combination of predictors so that the investigator may make some sort of judgment concerning the relative importance of each variable.

Because there is a possibility of over-fitting the data in multiple discriminant analysis, just as there is in multiple regression analysis, a cross-validation study will be carried out. The equation found to be optimal in one school will be applied to the same student data at another school. The effectiveness of the equation can then be evaluated in terms of the number of correct classifications; that is, the number of students who are correctly identified as persisters and the number of students correctly identified as dropouts.

A dropout is operationally defined as a high school pupil who leaves school, and does not enroll elsewhere, before graduation for any reason except death.

A persister is a student who enrolled in one of the two high schools in the school years studied and who re-enrolled the following year.

This research will attempt to identify variables which will assist in the task of differentiating persisters and dropouts in future years at Northeast High School, and to demonstrate the feasibility of assigning predictive discriminant function coefficients from variables at Northeast High School to the same variables at East High School in Kansas City. The hypothesis that prediction of dropouts at one school may be accomplished on the basis of their resemblance to dropouts at another school will be examined through cross-validation.

Some 44 continuous variables or characteristics were examined by the initial computer program run. Scores were not available for all students on all characteristics. Eleven variables were dropped because of insufficient numbers. The remaining 33 continuous variables were used as differentiators in most of the different groupings, on the basis that previous investigations reported in the literature had shown them to be related to characteristics of the school dropout.

1. Age of student
2. Average Language Arts Grade for K, 1, 2
3. Average Creative Language Grade for 3, 4, 5, 6
4. Average Language Mechanism Grade for 3, 4, 5, 6
5. Average Mathematics Grade for 3, 4, 5, 6
6. Average English for 7, 8
7. Average Mathematics Grade for 7, 8
8. Birth order in family
9. Elementary Stanford Reading FmK--Paragraph Meaning, Grade 3
10. Elementary Stanford Reading FmK--Word Meaning, Grade 3
11. Father's occupation
12. Grade in which first failure occurred
13. Grade in which first retention occurred
14. Grade point average 7, 8
15. Number of absences 7, 8
16. Number of absences last full year in school
17. Number of children in family
18. Number of retentions
19. Number of school transfers
20. Number of tardies 7, 8

21. Number of tardies last full year in school
22. Stanford Achievement Test FmL--Paragraph Meaning, Grade 6
23. Stanford Achievement Test FmL--Word Meaning, Grade 6
24. Stanford Achievement Test FmL--Spelling, Grade 6
25. Stanford Achievement Test FmL--Language, Grade 6
26. Stanford Achievement Test FmL--Arithmetic Reading, Grade 6
27. Stanford Achievement Test FmL--Arithmetic Computation, Grade 6
28. Stanford Binet Intelligence Quotient
29. Student quartile
30. Teacher rating--Getting along with others
31. Teacher rating--Responsibility
32. Teacher rating--Self-control
33. Teacher rating--Work habits

Review of Related Research

A wide diversity of factors has been studied in relation to persistence in the public schools. Research was selected for inclusion in this paper, with a few exceptions, on the basis of recency and the use of more than one variable to predict school withdrawal.

Boyles (1) collected information concerning dropouts from 229 forms returned from high schools in North Dakota. The schools involved stated that academic difficulty accounted for 20 percent of school withdrawals; parental influence, 21 percent; and marriage, 20 percent. The male dropout also listed academic difficulty as a major cause of withdrawal--24 percent--but he listed dislike of school, which the schools did not rank highly, as accounting for 29 percent of the dropouts. Pregnancy accounted for 42 percent of the reasons given for female dropouts.

Dropout behavior or "attendance status" is characterized by Bullock (2) as a combination of attendance, grades, number of retentions, and participation in school activities. In an attempt to test the reliability of his predictive instruments for dropout behavior among urban Negro boys in Houston, Texas, Bullock found that school records and family structure variables do predict better for _early_ leavers; for _late_ leavers, parental involvement and personal-social relations are better predictors. He added that similar socio-economic status did not necessarily mean similar academic performance and that intra-class academic differences do exist.

Cardon and Zurick (4) matched 125 male and 81 female dropouts from Pennsylvania high schools with an equal number of persisters. The dropouts were labeled high ability (I.Q. of 110 or greater). The two groups were matched on the basis of I.Q., neighborhood, and grade at the time of withdrawal. Parents' occupations did not differentiate. Personality descriptions of male and unmarried female dropouts described them as casual and adventuresome in their approach to life.

Carrino (5) examined records of 404 dropouts and 404 graduates from 13 school districts of Summit County, Ohio, in a ten-year study (1952-62) which endeavored to identify potential dropouts in the elementary school. For girls, the difference in I.Q. (Kuhlman-Anderson) between dropouts and graduates was 14.4 points; for boys, 16.0 points. Boys who withdrew had a lower average I.Q. than did girl dropouts, more males withdrew and withdrew earlier.

Other findings of this study: the reading ability of dropouts was lower; students poor scholastically left school early; and the average number of days absent per year for the male dropout was 41.2, female, 26.9--male persister 12.5, female, 10.8. The percentage for boys who demonstrated poor social behavior on teachers' ratings were 96.3 per cent for dropouts compared to 11.7 percent for persisters. Of girls who withdrew, 42.9 percent had adjustment problems serious enough to record compared to 3.3 percent of the persisters.

Parents of dropouts and persisters followed almost the same type of occupations; however, none of the dropouts' parents were professional people nor had any attended college. Carrino concluded that by utilizing the permanent record of each child, potential dropouts could be identified in the first three years of school or before.

Four groups were established by Childers (6), composed of 340 white ninth graders at Walker County Public Schools. Group I was made up of 77 dropouts of the year 1962-63; Group II, 77 persisters matched as to sex, grade, and school. Group III was made up of 93 withdrawals, 1963-64; and, Group IV, 93 students matched as in Group II.

After factor analysis, Childers used 13 variables for discriminant analysis. He found that for males and females these variables were significant: number of retentions; socio-economic position; participation in school activities; occupational aspiration level; and responses made to Cottle's School Interest Inventory. Language and non-language I.Q.; number of school transfers; personal adjustment; social adjustment; and reading were highly significant for male dropouts. For females, the number of natural parents with whom the dropout lived was of primary importance.

Coates (7) developed case studies for 141 students, called dropouts, from school files, interviews, and administration of the Thurstone Temperament Schedule. Students who withdrew from school were described as being from the lower socio-economic group, as having experienced failure in school work, and as often being rejected by teachers and peers. He found no evidence, as a group, of inability to read, and scholastic aptitude scores were not significantly different from the means of the particular school.

Cumming (8) found that differences between graduates and dropouts in the Minneapolis Public Schools were significant at the 0.001 level of the X^2 test of significance in the areas of present work, school attendance, father's occupation, and family status. This research presented a first-year evaluation of Outreach Counseling in four poverty areas.

In a study of pupil holding power in four Detroit high schools, Doolittle (9) used the X^2 level of significance at the 0.01 level to rank characteristics by their power to discriminate dropouts from graduates. Based on a sample of 1,100 beginning tenth graders in 1959, he concluded that a dropout had no "superior success sequence;" was retarded in grade; was most often absent, when compared to persisters; scored in the lowest quarter of the Detroit Intelligence Test, STEP Reading, SCAT Total, and STEP Arithmetic Tests; was a male; and came from the two lowest income neighborhoods.

Forty-nine small schools with a combined enrollment of 30,984 were sampled in a Texas small school project (10). Of this number 1.5 percent, or 459, were dropouts. From information derived from questionnaires sent to school administrators, it was found that the average age for withdrawal was 16; more males dropped out than females; and the dropout rate reached the maximum height in grade 10. The primary reason for female withdrawals was marriage; for males, a combination of reasons was given--low ability, parental attitudes, retardation, and dissatisfaction with school.

Beginning in September, 1963, each school district in Nevada was requested to report on school dropouts each month (11). In 1963-64 school year, 1,363 students withdrew; in 1964-65 the rate was up 29.92 percent.

In a comparison of the two school years, 60.88 percent of the dropouts fell in the below-average reading ability category in the first year; 69.42 percent in the second. In arithmetic skills, the percentages vary from 64.49 to 67.97. In the first year 67.75 percent of the dropouts were below average in academic performance; in the second year, 69.42 percent. An average of 70 percent of the withdrawals had an irregular, or poor, attendance record.

French and Cardon (13) found that the modal grade of withdrawal was grade eleven (40 percent), followed by grade 12 (35 percent). Their selected sample of high ability dropouts consisted of three groups: males, 125, unmarried females, 26; and married females, 55. A like-number of persisting high school students was matched by I.Q., neighborhood, and grade. The student sample is based on a complete listing of high ability high school dropouts, 1964-65, selected from 93 percent of the public and private schools of Pennsylvania.

Not substantiated as differentiators were frequent school transfers, generally low level of parental education, and lower parental employment status. Dropouts and persisters did differ significantly in areas of personality, willingness to conform, interests, educational skills, and family orientation to school.

French and Cardon (14) matched 125 male and 81 female high ability dropouts with a like number of other students of comparable intelligence, neighborhoods, and grade level. The mean I.Q. was 117. Data was utilized to construct an instrument to identify those who would benefit by a proposed training program.

Dropouts did differ from persisters in areas such as personality, interests, willingness to conform, educational skills, and family orientation toward school. Differences which were not substantiated included frequent school transfers (although 29 percent of the male dropouts and 33 percent of the girls had transferred), early part-time employment, and generally low parental education.

Graduates may be falsely identified, but large numbers of potential dropouts were identified by Gallington (15). This study took place in Alexander County, Illinois. Gallington concluded that dropouts tend to have older siblings more often than graduates, and absenteeism is more prevalent among dropouts in grades seven and eight than is retardation. The best objective predictors were achievement, reading placement, and mathematics placement. He found father's occupation an especially good measure. He stated that an accumulation of several correlates was found to be much more predictive of graduation than a single variable.

In a study of the school dropout and the implications for elementary school guidance, Getson (16) found that performance on ability measures is lower for the dropout. School personnel rated the dropouts' social and emotional ability lower than the remainder of the school population. The dropout is often overage for his grade; some 70 percent of all dropouts participate in no extra-curricular activities; and the dropouts' father more often than in the general population is semi-skilled, unskilled, or unemployed.

Grinder (18) hypothesized that a strong orientation toward the father and no interest in peer culture would predict involvement in the school program, and that potential dropout-status could be predicted by weak orientation toward the father and high involvement in the peer culture. He utilized a Social Interests Inventory and data from school records for 2,220 eleventh and twelfth grade boys in seven high schools throughout the state of Wisconsin. Multivariate procedures were used. The findings suggest that students can be classified potential dropouts, general-program, and college-bound at a level of significance.

Hamreus (20) utilized a population sample of 2,386 eighth graders in Spokane, Washington. He compared dropouts and total stayins, and dropouts with an equal-number of persisters, matched on sex, intelligence, and socio-economic status. He described dropouts as having lower grades; twice as many absences in the eighth grade as the persisters; less participation in arts and science, clubs, and so on; more younger siblings; separated parents to a greater degree than the persisters;and residence with both parents to a lesser degree than persisters.

When dropouts and persisters were matched, results of the discriminant function demonstrated that the best combination of variables to differentiate dropouts and persisters was: (1) number of days absent from the eighth grade; (2) number of hours worked per week; (3) number of younger siblings; and (4) attitude toward school. For dropouts and total stay-ins the best combination was: (1) MAT language study skills scores; (2) father's education; (3) degree of participation in clubs; and (4) attitude toward school.

Harding (21) found that high school dropouts and persisters differed significantly at the 0.001 level as to self-concept of academic ability, perceived parental expectations, and educational expectations or plans. He used 95 dropouts matched with persisters on the basis of academic ability, socio-economic status, and grade point average.

A school for returned dropouts provided the setting for a study by Hess (22). A group of 287 students who had spent a minimum of 20 daytime class hours at the Metropolitan Youth Educational Center were divided with 111 in the terminating group and 176 in the continuing group. Significant differences were found between the two groups: continuers drop out later; continuers did better on reading tests; continuers had more "C" grades in previous school experiences; continuers had fewer recorded disciplinary actions against them; continuers had fewer absences; and continuers were more adequately financed to meet normal school expenditures.

The Orange County Board of Education inaugurated a three-year summer school program for high school dropouts and potential dropouts (23). The dropout rate in Orange County was 17 percent, of which 46 percent were girls and 54 percent boys. Of these dropouts, 67 percent ranked in the lower one-third of their classes, although at least 70 percent ranked average or above in intelligence.

Marriage was common among female dropouts, and particularly among those who ranked in the middle or upper one-third of their classes. There was no significant relationship between mobility and school withdrawal. Seventy-eight percent of the dropouts' fathers were in semi-skilled and unskilled occupations. Withdrawals tended to be at least a grade behind in school, and lack of reading skills was the most common weakness in both dropouts and potential dropouts. Academic failure, no interest, and poor attendance were most commonly mentioned causes of attrition given by students.

Hopkins (24) attempted to derive a prediction equation from factors determined to be significant in identification of the high school dropout. Five hundred and five white students from seven Atlanta, Georgia, high schools were considered separately by sex. Predictions were correct for 72.2 percent to 87.8 percent of the students depending on the group. Regardless of the group, different predictions were required for males and females.

For males, absences were significant. For all students significant predictors were school achievement and occupational status of students' parents. Neither reading level nor general ability were indicative for identifying potential withdrawals, regardless of studies to the contrary.

In a study involving the total seventh grade population of four rural Texas communities in 1957-58, Kelly, et al. (25) found five years later (1962) that 322 students were still in school, 50 were dropouts, and 30 were labeled delinquents. Multiple discriminant analysis was utilized to determine which variables were most significant for each group.

Study I was based on the even numbered students, Study II, odd. Predictors providing the greatest contribution in Study I were Index of Social Status, STEP, Discrimination Reaction Time, and Junior Personality Quiz. Study I classified correctly 66 percent of the delinquents; 40 percent of the dropouts; and 62 percent of the normals. The best predictors in Study II were Wild Ones (peer nomination item), Dotting, and Step. Levels of prediction accuracy were: 60 percent of the delinquents; 60 percent of the dropouts; and 71 percent of the normals.

Lichter, et al (26), studied intellectually capable high school students who were potential dropouts over a four-year period. One hundred and five students from 25 different high schools in Chicago were selected to determine whether casework treatment could prevent withdrawal.

The number one problem for girls was attendance--80 percent; for boys, academic achievement--74 percent. For about half of the boys with school problems, the difficulty showed up as early as the fourth grade.

The purpose of a study by Markus (27) was to construct a model for use in predicting high school dropouts. A form of multivariate analysis was used to predict dropouts from a sample population of 270 eighth grade students in Chicago. It was found that additional data increased the percentage of correctly identified persisters, but not dropouts.

The factors which made the largest percentage contribution to prediction included age at graduation from elementary school; ninth-grade grade averages; social status; and family and social mobility. Factors making the smallest contributions were citizenship; grade averages in the tenth grade; reading ability; and intelligence.

In an effort to predict early school leavers in the rural schools, Moore (28) stated that approximately 80 percent of the males and 70 percent of the females were identified as potential dropouts at least a year before withdrawal. In a similar study based on 12,000 seventh grade pupils in New York state, Moore (29) found these characteristics listed on the prediction scale in rank order of decreasing ability to predict: age; retardation; I.Q.; pupil's interest in school; grades; and reading ability.

In a study of comparisons of graduates and dropouts utilizing information commonly contained in public school records, Muirhead (30) examined 196 dropouts and 390 high school graduates--all males. The total population had had all of their educational training in the Seattle Public Schools, and complete elementary school records were available for each student.

Significant differences at the 0.01 level were found in comparisons of general mental ability, reading ability, and in computational skill--graduates scored higher. Graduates had higher citizenship marks and fewer absences, attended fewer different schools, repeated fewer grades, and grade repeaters attended fewer schools.

In a random sample of 50 percent of a population of 1,878, Paolucci (31) identified dropouts with below normal age-grade achievement, high rate of subject failures and other adverse school experiences, as enrolled in terminal courses, as male, as coming up through the same school system, and with only limited extracurricular activities. Parents of dropouts were employed in occupations which required little training. Data were from school records and interviews.

Patrick (32) used the School Interest Inventory and teachers' evaluations to identify the potential dropout. With few exceptions the same students were identified by both means. Teachers' ratings were based on low reading ability; at least one retention; irregular attendance; no extra-curricular activities; no interest in school; serious emotional or physical handicap; and negative parental attitude toward education.

To determine the characteristics of dropouts, Randall (33) examined the cumulative records of 138 high school graduates and 138 dropouts. He compared these records on the basis of family characteristics, grade of entry, grade retention, attendance, extracurricular activities, standardized test results, and scholastic averages. He selected randomly 52 dropouts for interviews.

Significant differences reported included a considerably larger percentage of fathers of dropouts who were employed at unskilled jobs; almost two-thirds of the school dropouts who had been retained at least once; and absenteeism which was nearly three times greater among dropouts than persisters. Reading abilities of graduates tested higher; I.Q. scores and achievement test scores of graduates were higher; and the average report card marks of graduates were at least one letter grade higher.

The National Education Association's Report on School Dropouts (34) divided factors related to early school withdrawal into factors unique to each individual; school-related factors; family-related factors; and community-related factors. Many of the reports cited here are quoted elsewhere in this paper. One conclusion derived was that the range of I.Q. scores for dropouts may vary from study to study, but in no study cited did dropouts have higher average intelligence than high school graduates.

Schreiber (35) defines a dropout as more likely to be male than female, to be at least 16 because of the compulsory attendance laws, to be enrolled in tenth grade, to have been retained, and to be a poor school attender. The dropout has experienced failure or retardation in reading. School withdrawal is most serious among children whose parents' occupations are in lower class occupational levels and among children whose parents' attitude toward school is often negative or indifferent.

Students from low income families have a significantly lower tendency to stay in school. Stoller (37) raised the question--is this due to income? or to correlated factors? He hypothesized after examining the data: (1) dropouts are more a function of parental education than parental income; (2) dropout rates are higher in rural areas than urban; (3) there are no significant differences in dropout rates for white or nonwhite if the levels of permanent family income and parental education are the same; (4) there is a positive correlation between dropout rates and the tendency to be below modal grade in school; (5) negative correlation exists between the tendency of a pupil to be below modal grade and the family income; and (6) being below modal grade and parental education.

In another study, Stoller (38) examined 270 students who graduated, or were scheduled to graduate, in 1963, 1964, 1965 or 1966. The criterion for inclusion was performance difficulty or school withdrawal. Performance difficulty was defined as three Ds or Fs in high school.

Stoller found that early school performance was a good indicator of future academic difficulty, but not as good an indicator of dropout potential. Early school failures among dropouts came later than for poorly performing graduates. A comparison of these two groups indicates that graduates do somewhat better than dropouts academically and that dropouts tend to fall farther and farther behind. Over the years English was the subject most frequently failed.

Tuchman (40) studied 1,581 children--67 percent male--in out-patient clinics in Philadelphia. One of the 12 categories for which children were referred was "school problems," including poor school work, cheating, tardiness, and truancy. As the size of the family increased, there was an increase in referral for school problems.

Turchan (41) matched persisters and dropouts on the basis of sex (all males), age, general intelligence, and reading comprehension. His sample population consisted of 25 dropouts from an outer-city (suburban) high school, matched with an equal number of persisters; and 22 dropouts from an inner-city high school with matched persisters.

Parents of dropouts from both schools were significantly different at the 0.01 level from the parents of persisters in their attitude toward school. There was a significant difference at the 0.05 level between dropouts and persisters at the inner-city school and dropouts and persisters at the outer-city school in location of residence. For persisters, the level of parents' education was higher; parents were more often presently married to each other, had higher yearly incomes, and smaller families. Dropouts were characterized by lower grade point average, more grade failures, more absences, more referrals for delinquency, and more counselor contacts.

The student population for a study by Urdal (42) included all students in the Spokane, Washington, public schools who entered grades twelve, eight, and four in September, 1961. The total population was approximately 7,000. Cumulative folders were utilized for data, and some 200 selected twelfth graders were interviewed.

The majority of the dropouts had a grade point average to indicate probable high school graduation. However, persisters obtained higher grades than dropouts even when intellectual ability was equated. Verbal facility and language study skills were strong determiners of school withdrawal. When differences in ability were controlled, it was found that dropouts and persisters still differed on a number of other variables.

Dropouts had attended more different schools than persisters; student attendance record in junior high and high school was an important indicator; and dropouts had missed almost twice as much school as persisters. In comparison with matched persisters, school withdrawals had more younger siblings, were more likely to have parents who were separated, and by the twelfth grade 42 percent of the male dropouts and 13 percent of the girls had failed at least once. For dropouts, there was positive correlation between fathers' occupational level and all measures of ability and grades. This was true of all grade levels. If parents worked in higher level occupations, the student tended to stay in school longer.

In a study conducted in New York City, Voss, et al. (43) found that the I.Q. scores of graduates and dropouts showed little difference; in addition, all of the I.Q. scores were in the normal range. He called attention to the high correlation between I.Q. tests and reading test, e.g., good readers demonstrate higher I.Q.s on tests than poor readers. Finally he stated that capable dropouts tend to remain in school longer than those of limited ability. He elaborated on the differences between early and late dropouts.

Walters (45) utilized a form of multiple discriminant analysis which gave each student a discriminant function coefficient for each of nine variables. In a study at Evansville Reitz High School, Walters found that the best combination of predictors was age, I.Q., arithmetic achievement, and father's occupation. Father's occupation appeared in 24 of the 26 differentiator combinations and in all 11 of the predictor combinations. Ninety-one percent accuracy of prediction of dropouts was achieved, and 80 percent total accuracy.

In a study at the college level, Walters (46) used a program of multiple discriminant analysis and cross-validation to predict college attrition. This was a three group study, utilizing school transfers as the third group. The student sample of 544 was grouped into various categories, such as male and female; fraternity and non-fraternity; and so on.

When the top three positions in order of variable entrance were examined, class rank appeared most often, followed by the Cooperative English Test C2 sub-scores, birth order, SAT-V, father's education, mother's education, SAT-M, and parents' occupations. When percentages were used for total prediction accuracy, birth order groups had the high total average. Accuracy percentage for dropouts was highest for the middle child and for non-fraternity members.

Nine surveys of more than 21,000 dropouts concluded that while 30.7 percent of the general population had I.Q.s of 110 and above, only 11.0 percent of the school dropouts fell into this category; 50.0 percent of school dropouts, 90-109 (46.5 percent of the general population); 20.0 percent dropouts in the 80-89 range (14.5 percent general population); and 19 percent school dropouts were below 80 I.Q., as compared with 8.2 percent of the general population (47).

CHAPTER II

METHODS

The population and the school setting from which it was selected are described, and the data collecting procedures are discussed. A rationale for data coding utilized in the study is given, and the statistical treatment is presented.

Population

The schools. The student population for this investigation was drawn from two high schools in Kansas City, Missouri. Northeast High School was selected on the basis of a description by a Kansas City Board of Education administrator as"a fairly typical large-city high school."

Northeast has a high rate of attrition--over 14 percent according to the Report of High School Dropouts which is published annually by the Kansas City School District. East High School was also described as a "typical high school," although its withdrawal rate is lower (7.4 percent for 1967-68).

Both schools draw from a middle class population. Neither has a high transient population. Both are comprehensive high schools, in the sense of offerings, and are designated Triple A schools. Achievement by pupils in both schools is described as being in the average range.

Student population. The first population sample consisted of students from Northeast High School who were freshmen, sophomores, juniors, or seniors in the school years 1965-66 and 1966-67, and who withdrew before enrollment the following academic year. These students were called dropouts. Names of dropouts were obtained from the Kansas City Board of Education. Two school counselors, who were data collectors, cross-checked to determine whether students listed as dropouts were really transfers who later enrolled in another high school. Transfers were placed into a separate category, since by operational definition, a student who is enrolled in any high school is not a dropout. Girls who were pregnant when they withdrew were also categorized separately. Because of small numbers, these withdrawals were not placed in a separate program; however, their cards were not entered into the discriminant program with other dropouts.

A sample of students at Northeast High School who were freshmen, sophomores, juniors, or seniors in 1965-66 and 1966-67, and who were enrolled in the following school years 1966-67 and 1967-68 at Northeast High School was selected randomly. This student population was operationally defined as persisters.

For purposes of cross-validation a list of students who were freshmen, sophomores, juniors, or seniors at East High School in 1967-68 and who withdrew from school prior to enrollment in the following academic year was compiled. These students were called dropouts. A sample was selected randomly from students enrolled at East High School in the following school year, 1968-69. These students were defined as persisters.

To integrate these populations into the overall picture of the two high schools involved, dropout figures for the three-year period were examined. Of the total 1,777 students enrolled at Northeast High School in 1965-66, 14.9 percent did not enroll in high school in the following year. In 1966-67, of a total student population of 1,850 at Northeast High School, 14.32 percent did not enroll in 1967-68.

At East High School in 1967-68, there was a total school population of 1,851. There were 137 student withdrawals or 7.4 percent of the student population.

Collection of Data

The data which were collected for analysis were from three sources--Northeast High School files, East High School files, and the offices of the Kansas City Board of Education. The two data collectors were a counselor at Northeast High School and a counselor at East High School. Data was collected on 5 x 8 cards.*

Coding of the Data

Data was coded on a separate card for each student for the key punching process. Coding was rechecked to insure correctness. Other data coded numerically following the individual's code number were divided into dichotomous and continuous variables.

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*See Appendix A

Dichotomous Variables:

1. Persistence--dropout or persister
2. Sex--male or female

Continuous Variables:

1. Age of student--age was coded as below 14 years, above 18 years, and for each year and half year between this range
2. Student quartile--codings listed 1, 2, or 3 for each quartile*
3. Birth order--place in family was coded by number of siblings and rank in family
4. Number of children in family--the number was recorded
5. Father's occupation--occupation of father was coded on the basis of the Occupational Characteristics of the Index of Status Characteristics.** The general category of "unemployed" was added to this occupational classification
6. Grades--all grade averages were coded numerically: E--5, S--4, M--3, I--2, F--1
7. Tests--scores recorded for all tests were grade equivalents
8. Intelligence Quotient--standard scores were computed for the Stanford-Binet and the Otis Quick-Scoring Mental Ability Test for more accurate comparison
9. Numbers of absences, tardies, transfers, and retentions were recorded
10. Teacher's ratings--all ratings were recorded 1, 2, 3, 4, or 5. The highest rating possible was five--the lowest, one.

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*While quartile was the term used by the Board of Education, the second quartile spans the two quartiles on either side of the mean. The first quartile is 75-99; the second, 25-74; and the third quartile 1-24.

**See Appendix B

Statistical Treatment of Data

This study utilized a "Stepwise Discriminant Analysis" as developed by the Health Sciences Computing Facility of the University of California at Los Angeles. Multiple discriminant analysis was used to predict group membership on the basis of the attributes of students. There seems to be little difference between prediction accuracy by regression or discriminant functions; however, Goldman (17:183) comments that "to date, the Discriminant framework seems more promising than the Regression." Discriminant analysis assigns weights to variables in order to maximize the accuracy of prediction of placement into individual categories and to maximize the differences between profiles of dropouts and persisters.

When used in a stepwise manner, discriminant analysis yields F-level scores to determine the order of entrance into the program for each variable. The variable entered first will be selected on the basis of these equivalent criteria: (a) the variable with the largest F value: (b) the variable which has the highest multiple correlation with each group; and (c) the variable which would yield the greatest reduction of within to total generalized variances. To be included in the program, a variable must be significant at 0.01 level. For deletion, the F-level was 0.005. A classification matrix places pupils who are actually members of one group--dropouts, for example--into the group they are most like (dropouts or persisters), based on scores on all of the variables.

To cross-validate, the program was entered and the discriminant function coefficients from the first two years at Northeast High School were substituted for the coefficients of the year of cross-validation at East High School. To place a student in a group--dropout or persisters--the score for each variable was multiplied by the discriminant function for that variable, summed, and subtracted from a constant.

The chi-square test of significance (12) was applied to the classification matrix. The formula for chi square is

$$X^2 = \sum \frac{(O - E)^2}{E}$$

where

O = observed frequency for cells $N_1, N_2, \ldots N_i$
E = expected frequency for cells $N_1, N_2, \ldots N_i$

CHAPTER III

RESULTS

An objective of this research was to determine the extent to which dropouts at Northeast High School could be predicted using a program of multiple discriminant analysis. The principal objective was to determine whether dropouts at one school, East High School, could be predicted on the basis of discriminant functions derived from the discriminant analysis of characteristics of students from another high school, Northeast. The distribution of students is shown in Table 1.

TABLE 1. STUDENT ENROLLMENT AT NORTHEAST HIGH SCHOOL FOR TWO YEARS, NUMBER OF WITHDRAWALS, AND NUMBER OF PERSISTERS RANDOMLY SELECTED FOR THIS STUDY N = 866

	Years 1965-66 and 1966-67
Northeast High School enrollment	3,627
Dropouts	431
Persisters	435
Population of Study	866

The figures utilized in this study differ from the data available from the Office of the Kansas City Board of Education. If the school counselor knew that the student had enrolled in another high school, the student was not called a dropout although official records might include him in this category. If the student was labeled a dropout, but had re-enrolled in his original school, his classification was altered. The decision of the school counselor who was the data collector was considered final in student classification, although dropout data cards from the Board of Education provided the starting point for grouping. The official numbers are similar to the statistics utilized in this study, but not identical.

Students were classified into groups of dropouts or persisters. Whether a significant difference existed between an observed number of subjects in each category and an expected number based on the null hypothesis was examined. The percentage accuracy of the total prediction and the accuracy percentage of dropout prediction were computed for each group.

The program used for multivariate analysis performs in a stepwise manner. The order in which variables were entered depended on the manner in which data and subjects were grouped. Data were examined to ascertain which variables were most significant for each of several population groups. This particular program of multiple discriminant analysis ranks these characteristics in order of significance for each population category. In addition, data were examined for predictive value with these groups:

1. Student population of 866, Northeast High School, with all 33 variables entered.
2. Student population divided by sex. Male and female populations were entered with all variables as two separate groups.
3. Students divided into three groups by quartiles. These three groups were submitted to all variables, except quartile.
4. Student population divided into four groups by age. Each of these groups was programed with all variables, except age.
5. The identical student population divided into four categories by father's occupational grouping. Levels One and Two were one category; Levels Three and Four; Levels Five and Six; and Levels Seven and Eight made up the remaining three categories. Each variable was entered into the program, except father's occupation.
6. For teacher rating, getting along with others, the population divided by sex; then subdivided into one of five groups from highest to lowest. All variables were entered, with the exception of the one held constant.
7. Teacher rating--responsibility, not divided by sex because of low numbers. The population was divided into five groups based on teacher ratings. Teacher rating, responsibility, was the only variable omitted.
8. Student population divided into five groups by teacher rating, self-control. These groups were

subdivided by sex and programed with all variables, except the one held constant.

9. Teacher rating, work habits, divided into five groups from highest to lowest rating. These five groups were submitted to all variables, except the rating held constant.

Two categories were utilized for data examination for predictive value through cross-validation.

1. Student population of 269, East High School, with 33 variables entered.
2. Student population of East High School divided by sex, with all variables.

Variables Ranked in Order of Statistical Significance

Thirty-three variables were entered with a student population of 866. The top ten variables in order of significance are listed in Table 2.

TABLE 2. TEN VARIABLES RANKED IN ORDER OF STATISTICAL SIGNIFICANCE AS PREDICTORS OF PERSISTENCE N = 866

Variables	F-level*
Responsibility	101.5300
Age	81.9601
Grade first failure	45.5784
Math 7, 8	24.4315
Absences 7, 8	36.4092
Retentions	13.6825
Arithmetic Reading--Stanford Achievement, Gr. 6	8.4371
Absences last full year	7.0905
Father's occupation	5.9705
Tardies last full year	3.7004

*F-level for inclusion 0.01

For this group, the teacher rating--responsibility had the most significant F-value. When the student population was divided by sex for two separate groupings (see Table 3 and Table 4), responsibility appeared in sixth place for females, first for males. Other variables which appeared in the top ten by rank order for all three groups were Age, Grade of first failure, and Absences 7, 8. Variables which were present for the entire group and males include Quartile, Transfers, and another teacher rating--Work Habits. For the total group and the female group Arithmetic Reading--Stanford Achievement Test, Grade 6, and Absences for the last full year of school were listed in the upper ten by rank.

TABLE 3. TEN VARIABLES RANKED IN ORDER OF STATISTICAL SIGNIFICANCE AS PREDICTORS OF PERSISTENCE: FEMALES
N = 334

Variables	F-level*
Age	64.5338
Grade point average 7, 8	60.2686
Grade first failure	30.8879
Absences 7, 8	12.1050
Arithmetic Reading--Stanford Achievement, Gr. 6	12.6131
Responsibility	6.3661
IQ	7.5980
Tardies 7, 8	3.8996
Spelling--Stanford Achievement, Gr. 6	3.9417
Absences last full year	3.9172

*F-level for inclusion 0.01

TABLE 4. TEN VARIABLES RANKED IN ORDER OF STATISTICAL SIGNIFICANCE AS PREDICTORS OF PERSISTENCE: MALES
N = 532

Variables	F-level*
Responsibility	72.0087
Absences 7, 8	27.0123
Grade first retention	17.0524
Math 7, 8	15.3838
Age	16.3965
Quartile	7.8800
Grade first failure	6.1943
Transfers	3.2647
Work habits	2.6611
Retentions	2.6801

*F-level for inclusion 0.01

The F-value for Absences 7, 8 is larger than for Math 7, 8, although Absences was entered later. As each variable is added, the F-levels of subsequent variables may change.

When male and female rankings are compared, some differences in variable ranking can be noted. Responsibility has the largest F-value for males, but is of lesser significance in predicting the female dropout. Age is of first importance for females, but of less significance for males.

Grade point average ranks second in ranked F-levels for girls, but does not appear in the top ten as an indicator of school withdrawal for males. Two achievement test scores are ranked for females, but not for males. IQ scores and Tardiness may predict a female school dropout, but not a male.

For boys, Grade in which the first retention occurred was third in ranking, but this variable was not listed in the top ten for females. Math grades, Quartile and teacher rating--Work habits were also ranked for males only.

The order in which variables were added differed depending on the student's age. When age was held constant, the student population was divided into four groups. The first group included students 16 years of age and younger as shown in Table 5. Top ten variables for ages 16 to 17 are shown in Table 6; 17 to 18 years of age, Table 7; and top variables for students 18 and above when divided on the basis of age are shown in Table 8.

TABLE 5. TOP TEN VARIABLES RANKED IN ORDER OF STATISTICAL SIGNIFICANCE AS PREDICTORS OF PERSISTENCE: AGE TO SIXTEEN AND OVER N = 151

Variables	F-level*
Responsibility	20.4676
Grade first failure	25.0439
Absences 7, 8	18.7532
Grade point average 7, 8	9.2401
Birth order	5.0645
Work habits	4.7728
Paragraph Meaning--Stanford Reading, Gr. 3	2.4934
Word Meaning--Stanford Achievement, Gr. 6	2.2899
Arithmetic Reading--Stanford Achievement, Gr. 6	2.6316
Tardies last full year	2.8840

*F-level for inclusion 0.01.

TABLE 6. TOP TEN VARIABLES RANKED IN ORDER OF STATISTICAL SIGNIFICANCE AS PREDICTORS OF PERSISTENCE: AGE SIXTEEN TO SEVENTEEN N = 242

Variables	F-level*
Math 7, 8	14.3126
Absences 7, 8	18.8556
Grade first failure	6.7063
Word Meaning--Stanford Reading, Gr. 3	7.3011
Tardies last full year	5.3650
Retentions	5.7154
English 7, 8	3.6034
Work habits	1.9529
Absences last full year	1.8649
Language Arts K, 1, 2	1.5736

*F-level for inclusion 0.01.

TABLE 7. TOP TEN VARIABLES RANKED IN ORDER OF STATISTICAL SIGNIFICANCE AS PREDICTORS OF PERSISTENCE: AGE SEVENTEEN TO EIGHTEEN N = 334

Variables	F-level*
Responsibility	55.0551
Math 7, 8	19.1366
Grade first retention	17.4526
Arithmetic Reading--Stanford Achievement, Gr. 6	7.4114
Grade first failure	5.9030
Spelling--Stanford Achievement, Gr. 6	4.2747
Quartile	2.9247
IQ	2.7122
Father's occupation	2.7393
Tardies last full year	2.1038

*F-level for inclusion 0.01.

TABLE 8. TOP TEN VARIABLES RANKED IN ORDER OF STATISTICAL SIGNIFICANCE AS PREDICTORS OF PERSISTENCE: AGE EIGHTEEN AND ABOVE N = 132

Variables	F-level*
Responsibility	25.7818
English 7, 8	5.4635
Birth order	3.9770
Number of children in family	4.8552
Grade point average 7, 8	6.3422
Spelling--Stanford Achievement, Gr. 6	1.5142
Arithmetic Computation--Stanford Achievement, Gr. 6	5.2751
Word Meaning--Stanford Achievement, Gr. 6	1.8018
Language--Stanford Achievement, Gr. 6	3.0689
Father's occupation	1.2508

*F-level for inclusion 0.01.

No one variable appeared in the listing of ten variables in all of the four groups. Responsibility was of first significance for students 16 and under, 17 to 18, and 18 and above. It was not listed in the top ten for students between the ages of 16 and 17.

Number of tardies for the last full year in school was ranked last in the first and third groups and fifth in the second. It was not ranked for the fourth age group.

Three variables were listed for the two lower age groups--Grade in which first failure occurred was number one and number three, respectively. Absences 7, 8 was ranked number three and two; and a teacher rating--Work habits was number six and eight.

For the two older age groups, Spelling--Stanford Achievement, Grade 6 and Father's occupation were given in common. English 7, 8 was listed by the second and fourth age groups, Arithmetic Reading--Stanford Achievement, Grade 6, for age groups one and three.

The oldest and youngest age brackets had three variables in common--Grade point average (fourth and fifth in order), Birth order (fifth and third), and Word Meaning--Stanford Achievement, Grade 6 (number eight for both age groups).

There were 147 students in the first quartile represented in Table 9. In Table 10 results of prediction for 451 second quartile ranked students are shown; and in Table 11, results for 241 third quartile high school students.

TABLE 9. TOP TEN VARIABLES RANKED IN ORDER OF STATISTICAL SIGNIFICANCE AS PREDICTORS OF PERSISTENCE: FIRST QUARTILE
N = 147

Variables	F-level*
Grade first failure	38.8778
Transfers	12.9941
Grade first retention	9.7291
Tardies 7, 8	4.2195
Age	3.9533
Grade point average 7, 8	4.0362
Father's occupation	3.0673
Birth order	2.8105
Tardies last full year	1.7196
Absences last full year	3.1109

*F-level for inclusion 0.01.

TABLE 10. TOP TEN VARIABLES RANKED IN ORDER OF STATISTICAL SIGNIFICANCE AS PREDICTORS OF PERSISTENCE: SECOND QUARTILE
N = 451

Variables	F-level*
Paragraph Meaning--Stanford Achievement, Gr. 6	25.8403
Age	14.8042
Grade first failure	8.3967
Number of children in family	8.4336
Paragraph Meaning--Stanford Reading, Gr. 3	5.6544
Transfers	2.7825
Math 7, 8	2.7344
English 7, 8	2.8839
Language Mechanism 3, 4, 5, 6	1.8847
Math 3, 4, 5, 6	2.3869

*F-level for inclusion 0.01.

TABLE 11. TOP TEN VARIABLES RANKED IN ORDER OF STATISTICAL SIGNIFICANCE AS PREDICTORS OF PERSISTENCE: THIRD QUARTILE
N = 241

Variables	F-level*
Age	49.4848
Getting along with others	25.0668
Grade point average 7, 8	6.9758
Father's occupation	13.0624
Word Meaning--Stanford Reading, Gr. 3	6.4911
Transfers	3.6626
Absences 7, 8	3.5191
IQ	3.0469
Tardies last year in school	2.4441
Math 7, 8	1.9337

*F-level for inclusion 0.01.

When students were divided into three groups on the basis of their quartile rank, it was noted that two variables were significant regardless of quartile. School Transfers and student's Age appeared in all quartile rankings. Age had the highest F-value for students in the third quartile, ranked second for those in the second quartile, and ranked in fifth place for first quartile students.

Grade in which first failure occurred was in first place for the first quartile student. It was in third place for the second.

Three variables appeared in the top ten ranking for both first and third quartiles--Tardies for the last year of school attendance, Grade point average, and Father's occupation. Second and third quartile students had Math 7, 8 as a common variable.

Grade of first retention was in third place for first quartile students, but did not appear in the other listings. Paragraph Meaning--Stanford Achievement Test, Grade 3 and Grade 6 scores were significant for students in the second quartile, but not for other groupings.

Number of children in the family was ranked in the fourth position for second quartile and two English grades were listed, but then were not given for other quartile groups. A teacher rating--Getting along with others was significant at second place level for students in the third quartile. It was not mentioned for the other groups.

Most of the 40 separate listings of variables when birth order is held constant consist of non-academic factors (15 by count were academic variables). Age of student was a highly significant indicator when students were grouped by birth order. Whether the student group was composed of single children or twins represented in Table 12; the oldest child in Table 13; middle child in Table 14; or youngest child shown in Table 15, age of student was first, second, or third ranked.

Number of children in family was either first or second ranked for three birth order groups (exception: single child or twin). Three variables were significant for all groups except the middle child--Father's occupation, Responsibility, and Math 7, 8 (however, Math 3, 4, 5, 6 was listed for the middle child).

TABLE 12. TOP TEN VARIABLES RANKED IN ORDER OF STATISTICAL SIGNIFICANCE AS PREDICTORS OF PERSISTENCE: BIRTH ORDER, SINGLE CHILD OR TWIN N = 25

Variables	F-level*
Tardies 7, 8	8.2821
Age	8.6212
Paragraph Meaning--Stanford Achievement, Gr. 6	9.8958
Math 7, 8	7.3673
Grade first retention	5.1401
Absences last full year	3.9461
Work habits	2.3986
Language Arts K, 1, 2	2.5935
Responsibility	1.0298
Father's occupation	0.7382

*F-level for inclusion 0.01.

TABLE 13. TOP TEN VARIABLES RANKED IN ORDER OF STATISTICAL SIGNIFICANCE AS PREDICTORS OF PERSISTENCE: BIRTH ORDER, OLDEST CHILD N = 179

Variables	F-level*
Number of children in family	45.4544
Father's occupation	20.8092
Age	21.6334
Math 7, 8	6.0409
Quartile	1.8214
Absences last full year	2.0042
Tardies last full year	3.4311
Self-control	1.1134
Responsibility	7.4461
Grade point average 7, 8	1.2375

*F-level for inclusion 0.01.

TABLE 14. TOP TEN VARIABLES RANKED IN ORDER OF STATISTICAL SIGNIFICANCE AS PREDICTORS OF PERSISTENCE: BIRTH ORDER, MIDDLE CHILD N = 230

Variables	F-level*
Age	9.4388
Number children in family	5.9253
Quartile	6,6666
Absences 7, 8	2.3244
Math 3, 4, 5, 6	2.6084
Word Meaning--Stanford Achievement, Gr. 6	2.4362
Paragraph Meaning--Stanford Achievement, Gr. 6	4.1162
Tardies last full year	1.8391
Getting along with others	1.7811
Language Mechanism 3, 4, 5, 6	1.1646

*F-level for inclusion 0.01

TABLE 15. TOP TEN VARIABLES RANKED IN ORDER OF STATISTICAL SIGNIFICANCE AS PREDICTORS OF PERSISTENCE: BIRTH ORDER, YOUNGEST CHILD N = 182

Variables	F-level*
Number of children in family	35.6561
Father's occupation	21.8348
Age	16.1622
Math 7, 8	8.6899
Self-control	2.1023
Language--Stanford Achievement, Gr. 6	2.1070
School transfers	2.4067
Responsibility	1.7356
Work habits	3.0330
English 7, 8	1.3626

*F-level for inclusion 0.01.

A teacher rating--Work habits--was significant for the single child or twin and the youngest child. Self-control was significant for the oldest child and the youngest. Tardies 7, 8 was first in rank for the single child or twin, but was not included in the top ten variables for the three other birth order groups.

Students were grouped on the basis of father's occupation, and the highest level is a combination of Level One and Two as shown in Table 16. Only eight variables were significant at the 0.01 level for inclusion. The number of students for Level One and Two is 12, which throws doubt on the accuracy of that program.

IQ was a significant predictor for Level One and Two, Level Three and Four in Table 17, and Level Five and Six in Table 18. Absences for the last full year in school predicted for occupational Level One and Two and for the lowest Levels Seven and Eight as shown in Table 19 (ranked three and five respectively).

Predictor variables for Levels Three and Four, Five and Six, and Seven and Eight include Grade when first failure occurred, Number of children in the family, and Grade when first retention occurred.

TABLE 16. TEN VARIABLES RANKED IN ORDER OF STATISTICAL SIGNIFICANCE AS PREDICTORS OF PERSISTENCE: FATHER'S OCCUPATION, LEVEL ONE AND TWO N = 12

Variables	F-level*
Getting along with others	27.7885
Age	19.1221
Absences last full year	7.8286
Language Mechanism 3, 4, 5, 6	24.7206
Math 7, 8	5.2842
School transfers	7.4068
IQ	18.4558
Grade point average 7, 8	14.1310
Other F-levels NS	

*F-level for inclusion 0.01.

TABLE 17. TEN VARIABLES RANKED IN ORDER OF STATISTICAL SIGNIFICANCE AS PREDICTORS OF PERSISTENCE: FATHER'S OCCUPATION, LEVEL THREE AND FOUR N = 138

Variables	F-level*
Grade first failure	19.4950
Number of children in family	4.8479
Birth order	4.2242
Spelling--Stanford Achievement, Gr. 6	3.1987
Absences 7, 8	2.4735
Paragraph Meaning--Stanford Achievement, Gr. 6	2.4227
Language--Stanford Achievement, Gr. 6	2.3496
IQ	1.4860
English 7, 8	1.0355
Grade first retention	1.4032

*F-level for inclusion 0.01.

TABLE 18. TEN VARIABLES RANKED IN ORDER OF STATISTICAL SIGNIFICANCE AS PREDICTORS OF PERSISTENCE: FATHER'S OCCUPATION, LEVELS FIVE AND SIX N = 338

Variables	F-level*
Grade point average 7, 8	24.7971
IQ	11.2281
Age	12.6975
Tardies last full year	9.9630
Retentions	6.7953
Grade first failure	6.9922
Birth order	3.2595
Absences 7, 8	3.4924
Grade first retention	2.6304
Number of children in family	2.4834

*F-level for inclusion 0.01

TABLE 19. TEN VARIABLES RANKED IN ORDER OF STATISTICAL SIGNIFICANCE AS PREDICTORS OF PERSISTENCE: FATHER'S OCCUPATION, LEVELS SEVEN AND EIGHT   N = 185

Variables	F-level*
Self-control	10.3274
Grade first retention	9.1545
Number of children in family	6.3627
Grade first failure	5.1512
Absences last full year	9.3184
Quartile	3.8135
English 7, 8	1.8855
Word Meaning--Stanford Reading, Gr. 3	1.9288
Language Arts K, 1, 2	3.9022
Paragraph Meaning--Stanford Reading, Gr. 3	2.6760

*F-level for inclusion 0.01.

Getting along with others, a teacher rating, was number one for the highest occupational Levels One and Two. Teacher rating--Self control--was number one for occupational Levels Seven and Eight, the lowest occupational level.

When students were grouped on the basis of teacher rating, other teacher's ratings appeared more often than by chance. Whichever rating was held constant, at least one other appeared at each level (with one exception--Work habits, #4). Rating levels varied from five to one--five the "best" rating and one the lowest. Where numbers permitted, the rating was held constant and the students were subdivided by sex.

Neither of the extremes for Getting along with others was programed. The two lowest categories--1 and 2--were almost perfectly grouped as shown in Table 20. All except one of the 46 students rated by the teachers as #1 or #2 (lowest categories) withdrew from school. In the highest category (#5) the numbers were too few for accurate programing, only five dropouts and 31 persisters.

Level 3 and 4 (second and third highest) were subjected to the discriminant program after division on the basis of sex. In

Table 21 are the highest predictive variables for 107 female students rated #3; Table 22, male students, #3; Table 23, female, #4; and Table 24, male students rated #4.

TABLE 20. NUMBERS FOR TEACHER RATING--GETTING ALONG WITH OTHERS, LEVELS NOT ENTERED FOR PROGRAMING N = 82

Level	Dropout		Persister		Total
	Male	Female	Male	Female	
#1	2	1			3
#2	31	11	1		43
#5	3	2	12	19	36
					N = 82

TABLE 21. TEN VARIABLES RANKED IN ORDER OF STATISTICAL SIGNIFICANCE AS PREDICTORS OF PERSISTENCE: GETTING ALONG WITH OTHERS, FEMALE, #3 N = 107

Variables	F-level*
Work habits	1184.4393
Tardies 7, 8	17.6893
Responsibility	10.6633
Grade first failure	6.1351
Language Arts K, 1, 2	4.5119
Absences last full year	2.5414
Number of children in family	3.0316
Quartile	1.4084
Arithmetic Reading--Stanford Achievement, Gr. 6	1.7936
Language--Stanford Achievement, Gr. 6	2.2763

*F-level for inclusion 0.01

TABLE 22 TEN VARIABLES RANKED IN ORDER OF STATISTICAL SIGNIFICANCE AS PREDICTORS OF PERSISTENCE: GETTING ALONG WITH OTHERS, MALE, #3 N = 246

Variables	F-level*
Responsibility	34.8701
Quartile	6.1502
Age	5.7755
Grade first retention	4.5517
Creative Language 3, 4, 5, 6	3.6009
Language Mechanism 3, 4, 5, 6	4.2779
Absences last full year	3.0759
Tardies last full year	4.2118
Self-control	1.8817
Word Meaning--Stanford Achievement, Gr. 6	1.6423

*F-level for inclusion 0.01.

TABLE 23. TEN VARIABLES RANKED IN ORDER OF STATISTICAL SIGNIFICANCE AS PREDICTORS OF PERSISTENCE: GETTING ALONG WITH OTHERS, FEMALE, #4 N = 172

Variables	F-level*
Work habits	78.4627
Tarides 7, 8	3.2308
Arithmetic Reading--Stanford Achievement, Gr. 6	2.3290
Language Mechanism 3, 4, 5, 6	6.1787
English 7, 8	2.8676
Self-control	3.1724
Responsibility	3.4402
Grade point average 7, 8	1.8347
Father's occupation	1.1644
Tardies last full year	1.2707

*F-level for inclusion 0.01.

TABLE 24. TEN VARIABLES RANKED IN ORDER OF STATISTICAL SIGNIFICANCE AS PREDICTORS OF PERSISTENCE: GETTING ALONG WITH OTHERS, MALE, #4 N = 203

Variables	F-level*
Work habits	90.2109
Responsibility	4.5267
Quartile	2.6401
Tardies 7, 8	2.5831
English 7, 8	1.5510
Arithmetic Computation--Stanford Achievement, Gr. 6	4.0470
Creative Language 3, 4, 5, 6	2,8531
Language--Stanford Achievement, Gr. 6	1.8981
Self-control	1.6849
Grade point average 7, 8	1.3290

*F-level for inclusion 0.01.

Responsibility was first or second in F-level for the two male groups. It appeared in the upper ten variables for females also. Self-control and Work habits stood in the top ten among variables in three of the four groups.

Quartile ranked for all student groups except female, #4. Tardies 7, 8 was second on two variable listings and fourth on another. Tardies last full year appeared among the other omitted group's variables.

Numbers were too small to program Levels 1 (27 students) or 5 (7) of teacher rating--Responsibility. See Table 25 for distribution in these Levels.

There were 137 students placed at Level 2 represented in Table 26; 489 at Level 3 in Table 27; and 150 students, Level 4, in Table 28. Only one variable--Father's occupation--appeared among the first ten for each of these groups.

TABLE 25. NUMBERS FOR TEACHER RATING--RESPONSIBILITY, LEVELS NOT ENTERED FOR PROGRAMING N = 34

Level	Dropout	Persister	Total
#1	27		27
#5		7	7
			N = 34

TABLE 26. TEN VARIABLES RANKED IN ORDER OF STATISTICAL SIGNIFICANCE AS PREDICTORS OF PERSISTENCE: RESPONSIBILITY #2 N = 137

Variables	F-level*
Tardies last full year	8.3509
Absences 7, 8	5.1567
Paragraph Meaning--Stanford Achievement, Gr. 6	4.4525
IQ	5.5205
Language--Stanford Achievement, Gr. 6	2.0118
Math 7, 8	2.2614
Grade point average 7, 8	3.9013
Father' occupation	1.6765
Self-control	1.2955
Getting along with others	1.7929

*F-level for inclusion 0.01.

TABLE 27. TEN VARIABLES RANKED IN ORDER OF STATISTICAL SIGNIFICANCE AS PREDICTORS OF PERSISTENCE: RESPONSIBILITY #3 N = 489

Variables	F-level*
Work habits	761.1783
Tardies 7, 8	14.3758
Grade first failure	9.5675
Creative language grades 3, 4, 5, 6	5.4318
Quartile	5.6255
Self-control	4.9724
Age	4.3368
Father's occupation	3.4597
Birth order	2.8131
Absences last full year	2.0598

*F-level for inclusion 0.01.

TABLE 28. TEN VARIABLES RANKED IN ORDER OF STATISTICAL SIGNIFICANCE AS PREDICTORS OF PERSISTENCE: RESPONSIBILITY #4 N = 150

Variables	F-level*
Quartile	28.9349
Getting along with others	3.3217
Number of children in family	2.3181
Father's occupation	3.5888
Paragraph Meaning--Stanford Achievement, Gr. 6	3.7999
Grade first retention	2.9491
Spelling--Stanford Achievement, Gr. 6	3.4073
Age	1.6437
Word Meaning--Stanford Reading, Gr. 3	1.2698
Paragraph Meaning--Stanford Reading, Gr. 3	2.3283

*F-level for inclusion 0.01.

Tardies in the last full year of school was number one predicting variable for Level 2 group. Tardies 7, 8 was number two for Level 3. Quartile was number one predictor for the higher group--Level 4--and ranked fifth for Level 3. Two other teacher ratings--Self-control and Getting along with others--appeared among variables in two of these groups.

When Self-control is held constant, Level 1 has nine dropouts, no persisters; and Level 5 has nine persisters, no dropouts, as shown in Table 29. Level 2 did not have sufficient numbers when subdivided by sex.

Other teacher ratings held first place in the top ten variables for each of the four groups. Work habits was number one variable for female, Level 3 group as represented in Table 30. It also appeared in two other groups. Responsibility was first rated for male, Level 3, in Table 31; female, Level 4, in Table 32; and for male, Level 4, in Table 33.

TABLE 29. NUMBERS FOR TEACHER RATING--SELF-CONTROL, LEVELS NOT ENTERED FOR PROGRAMING N = 93

Level	Dropout		Persister		Total
	Male	Female	Male	Female	
#1	5	4			9
#2	54	4	15	2	75
#5			3	6	9
					N = 93

Student quartile ranked second among variables except for male, Level 3, where its rank was sixth. Age, IQ, and Language--Stanford Achievement Test, Grade 6, appeared in three of the four groupings. Math 7, 8 appeared twice and Math 3, 4, 5, 6 was represented in another group. More than any other student grouping, this group where Self-control was the constant, appeared to emphasize academic subject grades, test scores, and school-oriented categories.

TABLE 30. TEN VARIABLES RANKED IN ORDER OF STATISTICAL SIGNIFICANCE AS PREDICTORS OF PERSISTENCE: SELF-CONTROL FEMALE, #3 N = 153

Variables	F-level*
Work habits	152.7641
Quartile	5.9688
Responsibility	3.7297
Paragraph Meaning--Stanford Reading, Gr. 3	2.1047
School transfers	3.5738
Math 3, 4, 5, 6	2.3086
Language--Stanford Achievement, Gr. 6	2.1217
Paragraph Meaning--Stanford Achievement, Gr. 6	1.6461
IQ	1.4099
Language Mechanism 3, 4, 5, 6	1.1993

*F-level for inclusion 0.01.

TABLE 31. TEN VARIABLES RANKED IN ORDER OF STATISTICAL SIGNIFICANCE AS PREDICTORS OF PERSISTENCE: SELF-CONTROL MALE, #3 N = 317

Variables	F-level*
Responsibility	25.4255
Grade first retention	19.1043
Age	15.3199
Math 7, 8	9.4891
Absences 7, 8	14.0052
Quartile	3.8555
Work habits	2.1146
Language Arts K, 1, 2	1.8649
Language--Stanford Achievement, Gr. 6	1.6732
Retentions	1.9978

*F-level for inclusion 0.01.

TABLE 32. TEN VARIABLES RANKED IN ORDER OF STATISTICAL SIGNIFICANCE AS PREDICTORS OF PERSISTENCE: SELF-CONTROL FEMALE, #4 N = 134

Variables	F-level*
Responsibility	638.4644
Quartile	9.8364
Language Mechanism 3, 4, 5, 6	5.7994
Word Meaning--Stanford Achievement, Gr. 6	3.1997
IQ	2.6825
English 7, 8	3.4324
Math 7, 8	0.8182
Language--Stanford Achievement, Gr. 6	0.7897
Age	0.6219
Grade point average 7, 8	0.7187

*F-level for inclusion 0.01.

TABLE 33. TEN VARIABLES RANKED IN ORDER OF STATISTICAL SIGNIFICANCE AS PREDICTORS OF PERSISTENCE: SELF-CONTROL MALE, #4 N = 113

Variables	F-level*
Responsibility	84.3999
Quartile	51.9351
Work habits	5.0313
Tardies last full year	2.9079
Age	2.9011
Math 3, 4, 5, 6	1.8644
Creative Language 3, 4, 5, 6	3.1416
Word Meaning--Stanford Reading, Gr. 3	1.9907
IQ	1.8112
Grade first retention	1.5223

*F-level for inclusion 0.01.

Students were not subdivided by sex for teacher rating--Work habits. Level 1 and 5 were not programed because of numbers (27 and 5 respectively), as shown in Table 34.

TABLE 34. NUMBERS FOR TEACHER RATING--WORK HABITS, LEVELS NOT ENTERED FOR PROGRAMING N = 32

Level	Dropout	Persister	Total
#1	27		27
#5	3	2	5
			N = 32

Math grades appeared among the top ten variables for the three groups five times in addition to one arithmetic test score. See Table 35, Level 2; Table 36, Level 3; and Table 37, Level 4.

TABLE 35. TEN VARIABLES RANKED IN ORDER OF STATISTICAL SIGNIFICANCE AS PREDICTORS OF PERSISTENCE: WORK HABITS, #2 N = 174

Variables	F-level*
Age	17.2555
IQ	3.5328
Responsibility	3.3667
Tardies last full year	1.9476
Absences last full year	2.6007
Math 7, 8	2.0294
Absences 7, 8	1.8392
Grade point average 7, 8	1.3660
Paragraph Meaning--Stanford Reading, Gr. 3	1.1023
Math 3, 4, 5, 6	2.2133

*F-level for inclusion 0.01.

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TABLE 36. TEN VARIABLES RANKED IN ORDER OF STATISTICAL SIGNIFICANCE AS PREDICTORS OF PERSISTENCE: WORK HABITS #3 N = 484

Variables	F-level*
Responsibility	412.0909
Grade point average 7, 8	15.0870
Grade first retention	13.5007
Getting along with others	5.2996
Father's occupation	4.5338
Math 7, 8	4.0931
Tardies last full year	3.3881
Number of children in family	2.0294
Birth order	5.1412
Transfers	1.9204

*F-level for inclusion 0.01.

TABLE 37. TEN VARIABLES RANKED IN ORDER OF STATISTICAL SIGNIFICANCE AS PREDICTORS OF PERSISTENCE: WORK HABITS #4 N = 117

Variables	F-level*
Quartile	87.4854
Age	9.2390
Arithmetic Computation--Stanford Achievement, Gr. 6	7.4260
Retentions	2.5899
Absences last full year	2.5373
Math 3, 4, 5, 6	2.3782
Math 7, 8	5.0827
Paragraph Meaning--Stanford Reading, Gr. 3	2.1214
Grade first retention	1.9877
English 7, 8	1.7132

*F-level for inclusion 0.01.

Responsibility--another teacher rating--was third place for Level 2 and first for Level 3. Age was first for Level 2 and second for Level 4, and Grade point average was listed for Levels 2 and 3.

Prediction Data

Student populations were examined by accuracy prediction and by chi square. For accuracy prediction each student was placed into one of two groups--dropouts or persisters--by the program. Placement depended upon which of the two categories an individual student most resembled. The two accuracy cells were A and D. (See Table 38) These cells contained the number of cases correctly identified. The remaining two cells were error cells.

TABLE 38. PREDICTION BASED ON THE TWO-YEAR DATE, NORTHEAST HIGH SCHOOL, USING ALL VARIABLES N = 866

Observed	Dropouts	Persisters
Dropouts	A 415	B 16
Persisters	C 14	D 421

To determine the total percentage of prediction accuracy, cells A and D were summed and divided by the total number of students. The total accuracy of prediction was an indication of how well the program placed dropouts and persisters into the proper category.

The total accuracy of prediction of dropouts was determined by dividing the number of dropouts correctly predicted (A) by the total number of observed dropouts. Dropout accuracy indicated the extent to which a dropout was correctly identified.

Table 38 shows the results of the first attempt at accuracy prediction--the total accuracy percentage was 96.5, and the accuracy of predicting dropouts was 96.3 percent. Numerically, the table revealed that 415 of 431 actual dropouts were accurately predicted.

Prediction based on division by sex demonstrated high accuracy. Data in Table 39 revealed 97.0 percent total accuracy and 96.6 percent accuracy in predicting dropouts for women. In Table 40, 96.8 percent total accuracy of prediction for men was computed and 96.5 percent accuracy in prediction of dropouts.

TABLE 39. PREDICTION BASED ON THE TWO-YEAR DATA, NORTHEAST HIGH SCHOOL, WITH SUBJECTS GROUPED BY SEX: FEMALES
N = 334

Observed	Dropouts	Persisters
Dropouts	A 169	B 6
Persisters	B 4	D 155

TABLE 40. PREDICTION BASED ON THE TWO-YEAR DATA, NORTHEAST HIGH SCHOOL, WITH SUBJECTS GROUPED BY SEX: MALES
N = 532

Observed	Dropouts	Persisters
Dropouts	A 247	B 9
Persisters	C 8	D 268

Students were grouped by age with high predictive levels of accuracy. For students sixteen or under, the total accuracy of prediction was 97.4 percent. For Table 41, an accuracy of dropout prediction of 97.7 percent was computed.

For students between the ages of sixteen and seventeen, the results in Table 42 indicated a total percentage of 98.3 percent and a dropout prediction accuracy of 98.0 percent. Students seventeen to eighteen showed a total prediction accuracy of 97.6 percent in Table 43, and a dropout prediction accuracy of 97.0 percent.

TABLE 41. PREDICTION BASED ON THE TWO-YEAR DATA, NORTHEAST HIGH SCHOOL, WITH SUBJECTS GROUPED BY AGE: SIXTEEN OR UNDER N = 151

Observed	Dropouts	Persisters
Dropouts	A 125	B 3
Persisters	C 1	D 22

TABLE 42. PREDICTION BASED ON THE TWO-YEAR DATA, NORTHEAST HIGH SCHOOL, WITH SUBJECTS GROUPED BY AGE: SIXTEEN TO SEVENTEEN N = 242

Observed	Dropouts	Persisters
Dropouts	A 146	B 3
Persisters	C 1	D 92

TABLE 43. PREDICTION BASED ON THE TWO-YEAR DATA, NORTHEAST HIGH SCHOOL, WITH SUBJECTS GROUPED BY AGE: SEVENTEEN TO EIGHTEEN N = 334

Observed	Dropouts	Persisters
Dropouts	A 99	B 3
Persisters	C 5	D 227

The final age grouping--students eighteen and over--demonstrated a total accuracy of prediction of 97.7 percent. The results in Table 44 indicated a dropout prediction accuracy of 97.8 percent.

TABLE 44. PREDICTION BASED ON THE TWO-YEAR DATA, NORTHEAST HIGH SCHOOL, WITH SUBJECTS GROUPED BY AGE: EIGHTEEN OR OVER N = 132

Observed	Dropouts	Persisters
Dropouts	A 44	B 1
Persisters	C 2	D 85

Prediction by quartile indicated varying levels of accuracy. For the first quartile there was total prediction accuracy of 94.6 percent and accuracy prediction for dropouts of 95.7 percent, as shown in Table 45.

TABLE 45. PREDICTION BASED ON THE TWO-YEAR DATA, NORTHEAST HIGH SCHOOL, WITH SUBJECTS GROUPED BY QUARTILE: FIRST N = 147

Observed	Dropouts	Persisters
Dropouts	A 22	B 1
Persisters	C 7	D 117

Prediction for the second quartile was reported in Table 46. An overall accuracy of 67.6 percent and a predictive dropout accuracy of 66.8 percent were computed. Total accuracy of prediction for the third quartile was 87.1 percent. The accuracy of prediction for dropouts was 84.6 percent. These data were reported in Table 47.

TABLE 46. PREDICTION BASED ON THE TWO-YEAR DATA, NORTHEAST HIGH SCHOOL, WITH SUBJECTS GROUPED BY QUARTILE: SECOND N = 451

Observed	Dropouts	Persisters
Dropouts	A 155	B 77
Persisters	C 69	D 150

TABLE 47. PREDICTION BASED ON THE TWO-YEAR DATA, NORTHEAST HIGH SCHOOL, WITH SUBJECTS GROUPED BY QUARTILE: THIRD N = 241

Observed	Dropouts	Persisters
Dropouts	A 132	B 24
Persisters	C 7	D 78

There was perfect (100 percent) prediction of total and dropout accuracy for the single child or twin when students were grouped by birth order. However, as shown in Table 48, numbers were small.

TABLE 48. PREDICTION BASED ON THE TWO-YEAR DATA, NORTHEAST HIGH SCHOOL, WITH SUBJECTS GROUPED BY BIRTH ORDER: SINGLE CHILD N = 25

Observed	Dropouts	Persisters
Dropouts	A 10	B 0
Persisters	C 0	D 15

Prediction for the oldest child in the family was shown in Table 49. An overall accuracy of 89.9 percent and a dropout prediction accuracy of 90.0 percent were reported.

TABLE 49. PREDICTION BASED ON THE TWO-YEAR, NORTH-EAST HIGH SCHOOL, WITH SUBJECTS GROUPED BY BIRTH ORDER: OLDEST CHILD N = 179

Observed	Dropouts	Persisters
Dropouts	A 72	B 8
Persisters	C 10	D 89

When students were grouped as middle children, the predictive totals were lower. In Table 50, the total accuracy of prediction was 73.9 percent, with a dropout prediction level of 72.0 percent.

TABLE 50. PREDICTION BASED ON THE TWO-YEAR DATA, NORTH-EAST HIGH SCHOOL, WITH SUBJECTS GROUPED BY BIRTH ORDER: MIDDLE CHILD N = 230

Observed	Dropouts	Persisters
Dropouts	A 90	B 35
Persisters	C 25	D 80

In Table 51, 89.6 percent total accuracy of prediction for the youngest child was computed. A slightly higher level of prediction--92.8 percent--was computed for school dropouts.

TABLE 51. PREDICTION BASED ON THE TWO-YEAR DATA, NORTHEAST HIGH SCHOOL, WITH SUBJECTS GROUPED BY BIRTH ORDER: YOUNGEST CHILD N = 182

Observed	Dropouts	Persisters
Dropouts	A 64	B 5
Persisters	C 14	D 99

Perfect prediction was computed for Levels One and Two when students were grouped on the basis of their father's occupation. Numbers were too small to demonstrate prediction accuracy, however, as shown in Table 52.

TABLE 52. PREDICTION BASED ON THE TWO-YEAR DATA, NORTHEAST HIGH SCHOOL, WITH SUBJECTS GROUPED BY FATHER'S OCCUPATION: LEVEL ONE AND TWO N = 12

Observed	Dropouts	Persisters
Dropouts	A 3	B 0
Persisters	C 0	D 9

Results of prediction for Levels Three and Four of groupings based on father's occupation were shown in Table 53. There was a total prediction accuracy of 84.8 percent and accuracy prediction for dropouts of 79.3 percent.

TABLE 53. PREDICTION BASED ON THE TWO-YEAR DATA, NORTHEAST HIGH SCHOOL, WITH SUBJECTS GROUPED BY FATHER'S OCCUPATION: LEVEL THREE AND FOUR N = 138

Observed	Dropouts	Persisters
Dropouts	A 23	B 6
Persisters	C 15	D 94

When Levels Five and Six were grouped, total accuracy of prediction was 80.5 percent. (See Table 54) Prediction of accuracy for dropouts was 77.3 percent.

TABLE 54. PREDICTION BASED ON THE TWO-YEAR DATA, NORTHEAST HIGH SCHOOL, WITH SUBJECTS GROUPED BY FATHER'S OCCUPATION: LEVEL FIVE AND SIX N = 338

Observed	Dropouts	Persisters
Dropouts	A 143	B 42
Persisters	C 24	D 129

The lowest levels of occupational grouping (unskilled or unemployed), demonstrated a total prediction accuracy of 74.6 percent. For dropouts, the level of prediction was lower--51.9 percent. (See Table 55).

TABLE 55. PREDICTION BASED ON THE TWO-YEAR DATA, NORTHEAST HIGH SCHOOL, WITH SUBJECTS GROUPED BY FATHER'S OCCUPATION: LEVEL SEVEN AND EIGHT N = 185

Observed	Dropouts	Persisters
Dropouts	A 67	B 29
Persisters	C 18	D 71

Overall, groupings made on the basis of teacher ratings predicted very accurately. The highest (five) and lowest (one and two) ratings were not programed because of small numbers. (See Tables 20, 25, 29, and 34)

When students were grouped by the rating--getting along with others--total prediction accuracy for #3 group, females, was 99.0 percent as shown in Table 56. Dropout level of accuracy was 98.6 percent. Prediction for persisters was 100.0 percent.

TABLE 56. PREDICTION BASED ON THE TWO-YEAR DATA, NORTHEAST HIGH SCHOOL, WITH SUBJECTS GROUPED BY TEACHER RATING: GETTING ALONG WITH OTHERS, #3 FEMALE N = 107

Observed	Dropouts	Persisters
Dropouts	A 72	B 1
Persisters	C 0	D 34

Other groupings and their total percentage of accuracy of prediction and accuracy of dropout prediction, respectively, were #3, male, 92.7 and 91.6 in Table 57; #4, female, 89.0 and 97.1 in Table 58; #4, male, 89.7 and 96.8 in Table 59. For the last two groups which were the highest as teachers ranked from five to one, accuracy of prediction for dropouts was much higher than that of the total accuracy of prediction.

TABLE 57. PREDICTION BASED ON THE TWO-YEAR DATA, NORTHEAST HIGH SCHOOL, WITH SUBJECTS GROUPED BY TEACHER RATING: GETTING ALONG WITH OTHERS, #3, MALE N = 246

Observed	Dropouts	Persisters
Dropouts	A 120	B 11
Persisters	C 7	D 108

TABLE 58. PREDICTION BASED ON THE TWO-YEAR DATA, NORTHEAST HIGH SCHOOL, WITH SUBJECTS GROUPED BY TEACHER RATING: GETTING ALONG WITH OTHERS, #4, FEMALE N = 172

Observed	Dropouts	Persisters
Dropouts	A 68	B 2
Persisters	C 17	D 85

TABLE 59. PREDICTION BASED ON THE TWO-YEAR DATA, NORTHEAST HIGH SCHOOL, WITH SUBJECTS GROUPED BY TEACHER RATING: GETTING ALONG WITH OTHERS, #4, MALE N = 203

Observed	Dropouts	Persisters
Dropouts	A 60	B 2
Persisters	C 19	D 122

Data in Table 60 revealed 98.5 percent total accuracy of prediction when the teacher rating group was for responsibility, for students ranked #2 (fourth lowest in rank). Dropout prediction was 93.3 percent accurate, and prediction of persistence was 100.0 percent for 17 students.

TABLE 60. PREDICTION BASED ON THE TWO-YEAR DATA, NORTHEAST HIGH SCHOOL, WITH SUBJECTS GROUPED BY TEACHER RATING: RESPONSIBILITY N = 137

Observed	Dropouts	Persisters
Dropouts	A 118	B 2
Persisters	C 0	D 17

In Table 61, 91.8 percent total accuracy of prediction for #3 group was computed and 84.5 percent accuracy in dropout prediction. For the #4 student group of teacher rating responsibility, there was a total predictive accuracy of 82.0 percent and dropout prediction accuracy of 84.6 percent shown in Table 62.

TABLE 61. PREDICTION BASED ON THE TWO-YEAR DATA, NORTHEAST HIGH SCHOOL, WITH SUBJECTS GROUPED BY TEACHER RATING: RESPONSIBILITY N = 489

Observed	Dropouts	Persisters
Dropouts	A 169	B 31
Persisters	C 9	D 280

TABLE 62. PREDICTION BASED ON THE TWO-YEAR DATA, NORTHEAST HIGH SCHOOL, WITH SUBJECTS GROUPED BY TEACHER RATING: RESPONSIBILITY N = 150

Observed	Dropouts	Persisters
Dropouts	A 33	B 6
Persisters	C 21	D 90

Self-control demonstrated the highest overall prediction averages for teacher ratings. For #3, female group the total prediction accuracy was 92.8 percent; dropout level, 92.6 percent, as shown in Table 63. Percentage levels for group #3, male, were 93.7 total and 90.7 for dropouts, shown in Table 64. In Table 65, levels for #4, female, group were 97.8 and 94.6 percent, respectively, with 100.0 percent prediction for persisters.

TABLE 63. PREDICTION BASED ON THE TWO-YEAR DATA, NORTHEAST HIGH SCHOOL, WITH SUBJECTS GROUPED BY TEACHER RATING: SELF-CONTROL #3, FEMALE N = 153

Observed	Dropouts	Persisters
Dropouts	A 75	B 6
Persisters	C 5	D 67

TABLE 64. PREDICTION BASED ON THE TWO-YEAR DATA, NORTHEAST HIGH SCHOOL, WITH SUBJECTS GROUPED BY TEACHER RATING: SELF-CONTROL #3, MALE N = 317

Observed	Dropouts	Persisters
Dropouts	A 127	B 13
Persisters	C 7	D 170

TABLE 65. PREDICTION BASED ON THE TWO-YEAR DATA, NORTHEAST HIGH SCHOOL, WITH SUBJECTS GROUPED BY TEACHER RATING: SELF-CONTROL #4, FEMALE N = 134

Observed	Dropouts	Persisters
Dropouts	A 53	B 3
Persisters	C 0	D 78

The highest level programed for males was #4. Percentages were 97.6 for total accuracy and 100.0 for 49 dropouts. (See Table 66)

TABLE 66. PREDICTION BASED ON THE TWO-YEAR DATA, NORTHEAST HIGH SCHOOL, WITH SUBJECTS GROUPED BY TEACHER RATING: SELF-CONTROL #4, MALE N = 123

Observed	Dropouts	Persisters
Dropouts	A 39	B 0
Persisters	C 3	D 81

When students were grouped by teacher rating--work habits--the highest or lowest groups predicted a higher level than the middle group. In Table 67, a total prediction accuracy of 96.6 percent was computed for #2 group. An accuracy of dropout prediction of 96.0 percent was reported, and the prediction percentage for 23 persisters was 100.0.

TABLE 67. PREDICTION BASED ON THE TWO-YEAR DATA, NORTHEAST HIGH SCHOOL, WITH SUBJECTS GROUPED BY TEACHER RATING: WORK HABITS #2 N = 174

Observed	Dropouts	Persisters
Dropouts	A 145	B 6
Persisters	C 0	D 23

For the middle #3 group (see Table 68), total accuracy of prediction was 88.6 percent; for dropouts, 77.1 percent. The highest programed rating by teachers on work habits was #4. There was a total prediction accuracy of 96.6 percent and accuracy of prediction for dropouts was 89.3 percent, as shown in Table 69.

TABLE 68. PREDICTION BASED ON THE TWO-YEAR DATA, NORTHEAST HIGH SCHOOL, WITH SUBJECTS GROUPED BY TEACHER RATING: WORK HABITS #3 N = 484

Observed	Dropouts	Persisters
Dropouts	A 138	B 41
Persisters	C 14	D 291

TABLE 69. PREDICTION BASED ON THE TWO-YEAR DATA, NORTHEAST HIGH SCHOOL, WITH SUBJECTS GROUPED BY TEACHER RATING: WORK HABITS #4 N = 117

Observed	Dropouts	Persisters
Dropouts	A 25	B 3
Persisters	C 1	D 88

Cross-validation by students from a different high school demonstrated very high levels of prediction accuracy for some groups. The total accuracy of prediction percentage by cross-validation for all variables was 88.8. Dropout accuracy for this group was still higher--91.2 percent--as shown in Table 70.

TABLE 70. PREDICTION BASED ON CROSS-VALIDATION WITH EAST HIGH SCHOOL DATA, USING ALL VARIABLES N = 269

Observed	Dropouts	Persisters
Dropouts	A 124	B 12
Persisters	C 18	D 115

Prediction percentages for all female students were very low. In Table 71, the total prediction average was 51.4 percent for girls. The dropout average was even lower--23.7 percent based on 59 students.

For males, cross-validation presented a perfect dropout prediction based on 77 student male withdrawals. The total accuracy percentage by cross-validation was a high 92.5 percent based on a total number of 160 males. (See Table 72)

TABLE 71. PREDICTION BASED ON CROSS-VALIDATION WITH EAST HIGH SCHOOL DATA, USING ALL VARIABLES: FEMALES
N = 109

Observed	Dropouts	Persisters
Dropouts	A 14	B 45
Persisters	C 8	D 42

TABLE 72. PREDICTION BASED ON CROSS-VALIDATION WITH EAST HIGH SCHOOL DATA, USING ALL VARIABLES: MALES
N = 160

Observed	Dropouts	Persisters
Dropouts	A 77	B 0
Persisters	C 12	D 71

To attain a significant chi square the total number of observed dropouts and persisters must exceed the expected number in accuracy cells. An accuracy cell is one in which observed dropouts or persisters are predicted correctly. An error cell is a cell in which observed dropouts and persisters are placed incorrectly. There are four cells in each chi-square table.* In this investigation, there are 35 chi-square tables for prediction. Differences significant beyond the 0.001 level of confidence were present for 34 groupings. One of the three cross-validation tables (Females, Table 108) showed 0.50 level of confidence.

In Table 73 a summary of the level of significance for each student grouping is presented. Table 74 summarizes the levels of significance achieved by cross-validation.

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*See Appendix C

TABLE 73. SUMMARY OF SIGNIFICANCE OF EFFICIENCY TO PREDICT PERSISTENCE

Category		Number	Significance level
Thirty-three variables	: total population	866	0.001
	: females	334	0.001
	: males	532	0.001
Thirty-two variables	: age 16 and under	151	0.001
	: age 16-17	242	0.001
	: age 17-18	334	0.001
	: age 18 and over	132	0.001
Thirty-two variables	: first quartile	147	0.001
	: second quartile	451	0.001
	: third quartile	241	0.001
Thirty-two variables	: single child or twin	25	0.001
	: oldest child	179	0.001
	: middle child	230	0.001
	: youngest child	182	0.001
Thirty-two variables	: father's occupation, 1-2	12	0.001
	: 3-4	138	0.001
	: 5-6	338	0.001
	: 7-8	185	0.001
Teacher Ratings			
Thirty-two variables	: getting along with others, female #3	107	0.001
	: getting along with others, male #3	246	0.001
	: getting along with others, female #4	172	0.001
	: getting along with others, male #4	203	0.001
Thirty-two variables	: responsibility, #2	137	0.001
	: responsibility, #3	489	0.001
	: responsibility, #4	150	0.001
Thirty-two variables	: self-control, female, #3	153	0.001
	: self-control, male, #3	317	0.001
	: self-control, female, #4	134	0.001
	: self-control, male, #4	123	0.001
Thirty-two variables	: work habits, #2	174	0.001
	: work habits, #3	484	0.001
	: work habits, #4	117	0.001

TABLE 74. SUMMARY OF SIGNIFICANCE OF EFFICIENCY TO PREDICT PERSISTENCE--CROSS-VALIDATION

Category	Number	Significance
Thirty-three variables: total population	269	0.001
Thirty-three variables: females	109	0.50
Thirty-three variables: males	160	0.001

CHAPTER IV

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

This chapter summarizes the purposes, problems, and procedures used in the investigation. Conclusions were formulated on the basis of groupings of students and in terms of results obtained in the study. Recommendations were based on the findings.

Summary of Purpose, Problems, and Procedures

The purpose of this study was to identify characteristics which described high school students who withdrew from school. This investigation attempted to identify variables which would assist in the task of differentiating persisters and withdrawals in future classes at Northeast High School. In addition, this study attempted to predict school dropouts at one city school--East High School--on the basis of variable weightings drawn from a different school population at Northeast High School.

The problems examined in this investigation may best be stated in question form. Is it possible to predict dropouts from a high school by use of multiple discriminant analysis? At what level of accuracy? Are different variables of equal importance for dropout identification? Which variables are most important for prediction? How early may school withdrawal be predicted? Is it possible to predict dropouts from one school on the basis of their similarity to dropouts from another school? With what degree of accuracy?

In order to seek out answers to these questions, the study was confined to Northeast High School, Kansas City, Missouri, and to 866 students enrolled for the school years 1965-66 or 1966-67. For cross-validation, 269 students who enrolled in the fall of 1967 at East High School were subjects. A follow-up was conducted to determine whether each dropout would be defined operationally as a dropout or a transfer.

Student comparisons were based on the statistical analyses of data from the students' cumulative folders or from the offices of the Kansas City Board of Education. Part of the statistical analyses involved the use of the F-level test of significance to determine the order of importance of variables when the students were grouped into different categories.

The chi-square test of significance was used to determine differences in prediction of students into categories of persistence or withdrawal. In tests of significance, the 0.05 level of confidence was used as the base level for significant differences among groups. Accuracy percentages were also computed to determine accuracy of prediction.

Characteristics often mentioned in a review of the literature as being related to high school withdrawal included student's age; birth order; father's occupation; student ratings by the teacher; grade averages; quartile rank; IQ scores; test scores; number of tardies; number of absences; number of retentions; and school transfers. Analysis of this data from the student population of 1965-66 and 1966-67 was undertaken. The statistical design of the study provided an individual discriminant function coefficient for each of the 33 variables. In this way each student was assigned to the group he most resembled--dropout or persister. The coefficients, or weights, obtained from the data collected from the first two student populations at Northeast High School were applied to the data collected from the student population of 1967-68 from East High School.

Summary of Characteristics Which Differentiated Dropouts and Persisters

To set up prediction tables, variables were added in different order for each student category--for males and for females, for example. Variable order was determined by the size of the F-value.

By arbitrarily choosing to examine the top three positions in the order in which the variables were entered, it was found that a teacher rating--responsibility--and age appeared most often, followed by grade in which the first failure occurred and quartile rank. Appearing most often in the upper 10 ranked variables were age; teacher rating--responsibility; Math 7-8; quartile rank; and tardies for the last full year. Variables were never added in the same order for different categories. For example, the order of importance of descriptive characteristics was different for a male dropout and a female.

Summary of Prediction Data

Through discriminant analysis, the student population was classified into one of two groups--dropout or persister. For the first two-year student population, all groups achieved beyond the 0.001 level of significance. Groups which had greatest significance for prediction were all students; males; teacher rating--responsibility, #3 (middle group); age 17-18; females; teacher rating--work habits, #3; teacher rating--self-control, male, #3; and age 16-17.

The process of cross-validation added to the level of prediction in two groups. In order of significance were groupings of all students and males. Not significant at the 0.05 level were female students used for cross-validation.

When percentages were used, the highest categories for total prediction accuracy were teacher rating--getting along with others, female, #3; teacher rating--responsibility, #2; age 16-17; teacher rating--self-control, female, #4; age 18 and above; age 17-18; teacher rating-control, male, #4; age 16 and under; females; males; and teacher ratings--work habits, #2 and #4. Teacher ratings and age of student dictated the highest level of percentage accuracy of prediction.

Prediction of dropout accuracy was highest for teacher rating--self-control, male, #4 (100 percent); teacher rating--getting along with others, female, #3; teacher rating--responsibility, #2; age 16-17; age 18 and over; age 16 and under; teacher rating--getting along with others, female, #4; age 17-18; teacher rating--getting along with others, male, #4; and females. Again teacher ratings and age predicted at the highest level of accuracy. Cross-validation of dropouts exceeded the original prediction percentage in only one category--males (100 percent).

Conclusions

School dropouts can be predicted at a high level of accuracy by the use of multiple discriminant analysis. Of 32 separate dropout accuracy computations, 22 percentages were 90 or above.

The characteristics important for prediction varied with the individual grouping. When variables mentioned most frequently were combined, teachers' ratings ranked first, followed by

Stanford Achievement Test scores for Grade 6, number of absences, English grades, number of tardies, grades in Mathematics, and the student's age.

Results of this investigation indicate that high school withdrawal may be identified in the elementary grades. In prediction of total accuracy and dropout accuracy by percentages, the highest categories were teacher ratings and age of student. The ratings are available in the elementary school, and both categories may be determined at that level.

It was demonstrated by cross-validation that characteristics of dropouts from one high school--Northeast--may be utilized to predict dropouts from another high school--East--at varying levels of accuracy. When all East High School students were grouped together for cross-validation, the program demonstrated a highly significant level of accuracy. For males only, the rates for total and dropout predictive accuracy were even greater. Seventy-seven, or 100 percent of the male dropouts were predicted accurately on the basis of characteristics derived from school withdrawals from another high school. For girls, the accuracy prediction figures were low, although for predicting persisters the percentage was 84.

Recommendations

1. A study of the order in which variables were added to the program is recommended. For example, is it possible to predict persistence accurately for a female, 16 years old who is the youngest in her family--when all of these categories are descriptive of a single person?

2. Teacher ratings appeared to play a most important role in persistence at Northeast High School. Students who attained the highest rating, #5, on two of four ratings were all persisters. In teacher rating--getting along with others, 31 of 36 students were persisters (86.1 percent); for work habits, three of five students rated highest by teachers in this category were dropouts. All students who were ranked #1, the lowest teacher rating level, became school dropouts.

Teacher ratings are recorded by Kansas City teachers on the child's cumulative folder for each elementary grade. If he had all of his elementary school experience in the Kansas City system, there would be six ratings in each of the four categories. The figures utilized for this research were arithmetic averages. For purposes of this study, the population size utilized and the individual's own regression to the mean tend to minimize any rating discrepancies.

Little structuring or defining is done within the elementary schools involved regarding definitions for getting along with others, responsibility, self-control, or work habits. Although scientific basis may be lacking, there appears to be a consensus of term definitions. Since the ratings are completed in the elementary school, prediction on the basis of teacher ratings could be accomplished prior to junior high school. It is recommended that further study be given to these ratings and their relationship to persistence.

3. Student's age was a significant predictor of persistence at Northeast High School. A more detailed study of the significance of this variable is indicated.

4. Prediction levels for males and females were significant in the original two-year sample, and for the cross-validation year for males only. It was noted that with the exception of teacher-rating--responsibility; absences 7, 8; age; and grade of first failure, the first 10 variables entered for boys and girls were different. It is recommended that for identification of dropouts in future studies, males and females be considered separately.

5. In endeavoring to identify school dropouts, it is recommended that a combination of factors be examined. The levels of predictive accuracy attained in this study may be attributed, at least in part, to the number of differentiators utilized.

6. The high levels of accuracy of prediction for all students and males, through cross-validation, indicate a need to explore the possibilities of this method of prediction further. In cross-validation the discriminant function coefficients from the first two years at Northeast High School were substituted for coefficients of the cross-validation population at East High School. Students from East were placed into the group they most resembled. Classification was based on scores on the variables utilized in the study.

questions which should be raised--how similar, or dissimilar, are these two Kansas City high schools? At what levels of accuracy could potential dropouts from other high schools be predicted? Further investigations in these areas need to be made.

7. Based on the levels of predictive accuracy demonstrated in this study, school dropouts can be identified. Withdrawals from the first two-year sample and from the last year for cross-validation at a different high school were predicted beyond 0.001 level of significance (exception: females, in cross-validation sample).

Data for identification of dropouts were available from school cumulative records. Many of the most accurate prediction data were available in the elementary school. This program for identification should help the elementary teacher, counselor, and other school personnel become more aware of ways by which potential dropouts may be identified, and following identification, how to prevent future withdrawals.

A program of remediation needs to be established after identification. The potential withdrawal could be encouraged to remain in school through counseling and/or educational program modification. An awareness of the individual student classified a potential "dropout" by this program of multiple discriminant analysis will establish the basis for a preventive program.

8. It is recommended that a longitudinal study be carried out for additional years. This type of study would offer further evidence of the effectiveness of the methods and procedures employed in this investigation.

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Appendix A
Sample Card for Data Collection

____________________Name Birth date____________________

____Do, Pr, Tr, Ret, Grd 1-2-3-4-5
____M, F 1-2
____F, So, J, Fr 1-2-3-4-5th
____cause of withdrawal
____parent's sep, no, Uk 1-2-3
____Spec. Ed., no 1-2
____phy. prob, no 1-2
____emot. prob, no 1-2
____# times withdrew
____adm pro
____age DO________date
____quartile
____O____Y--birth order
____number of children in family

____father's occup 1-2-3-4-5-6-7-8
____aver. lang. arts grade K-1-2- E--5, S--4, M--3, I--2, F--1
____aver. creative lang. grades 3-4-5-6
____aver. lang. mech. grades 3-4-5-6
____aver. math 3-4-5-6
____aver. math 7-8
____aver. English 7-8
____GPA 7-8
Elem. Stanford Read. FmK,
____Gr 3 paragraph meaning
____word meaning
Elem. Stanford Arith FmK
____Gr. 4____Gr 5 reasoning
____ ____ computation

Stanford Achievement FmL
____Gr 3____Gr 6 paragraph meaning
____ ____ word meaning
____ ____ spelling
____ ____ language
____ ____ arith. read.
____ ____ arith. comput.
____IQ______________type
____# absences 7-8
____# absences last full year
____# tardies 7-8

____# tardies last full year
____# school transfers
____# retentions
____grade first failure
____grade first retention
Teacher ratings
____getting along with others
____responsibility
____self-control
____work habits

Appendix B
Index of Status Characteristics

The Index of Status Characteristics was developed by W. Lloyd Warner, Marchia Meeker, and Kenneth Eells is 1949 at the University of Chicago. The Status Index is based on two propositions--economic and prestige factors are highly correlated with social class; and social and economic factors, such as talent or money, must be translated into the social class status level acceptable to members of a community.

Characteristics in the Status Index are Occupation, Source of Income, House Type, and Dwelling Area. Warner, Meeker, and Eells state "if social class were to be predicted on the basis of one status characteristic, the most accurate prediction would be obtained by basing it upon occupation." (48:168) The highest correlation between social class and any one of the four variables in the Index is 0.91--between social class and occupation. Each occupation is classified according to kind of occupation and rated by level of occupation. In attempting to assign a rating to a job, the rater must decide whether it is an average job, below average, or above, and assign it a comparable rating.

The reliability of the occupational ratings made was tested by the investigator by randomly selecting one hundred occupational listings from the data (46:29). Three independent judges were asked to rate jobs using the Index. The type of rating is described by Guilford as an intraclass correlation or an average intercorrelation (19:395). The formula for computing reliability by this method is

$$\bar{r}_{11} = \frac{V_p - V_e}{V_p + (k - 1)\, V_e}$$

where

r_{11} = reliability of ratings for a single rater
V_p = variance of persons
V_e = variance or error
k = number of raters

This formula gives the reliability for mean ratings from k raters. This is the reliability for one rater.

The averages of the three raters

$$r_{kk} = \frac{V_p + V_e}{V_p}$$

The reliability for one rater of the Index was 0.91 (46:30). The reliability for the three raters combined was 0.97. When the occupation was not listed in the Index, the judges appraised the kind and level of occupation in a relatively consistent manner--probably on the basis of comparison to other known or listed occupations.

Index of Status Characteristics

Reference: Warner, W. Lloyd; Meeker, M.; and Eells, K., Social Class in America, Harper and Row, Publishers, Inc., New York, 1949

1. Occupation: (Multiply by 4) Classify the father according to kind of occupation and then rate him according to level, using attached charts.

OCCUPATIONAL RATINGS FOR THE INDEX OF STATUS CHARACTERISTICS

	PROFESSIONALS	PROPRIETORS	BUSINESSMEN	WHITE COLLAR WORKERS
1.	Doctor, dentist, engineer, judge, lawyer, minister, professor, school supt., et al.	Investment of $75-100,000 in business or industry; varies by community size.	"Top management" pres., mgr., execs. of corporations, public utilities, banks, et al.	Exec. Sec'y. of status orgns., C.P.A.; editor of reputed newspapers, magazines; exec. level of government.
2.	H.S. teacher; trained nurse; chiropodist; mortician; minister (no college educ.); veterinarian.	Reputed value of $20-70,000; a very good business but not the largest kind.	Asst., dept., & office mgrs. or supervisors; mgrs. of large branches; manufacturers' agents.	Accountant; insurance, stock and bond, real estate men in reputed firms; columnist, editorial writer, etc.
3.	Grade school teacher; asst. to undertaker; optician; city veterinarian; pharmacist; any unionized profession.	Value of equity reputed $5-20,000 in a "good" but rather "small" business.	Mgrs. of branch stores and businesses (no office staff); buyers and salesmen with "connections"; (office and secretary).	Bank and broker's clerks; secretary; senior postal clerk; RR agent; supervisor in pub. utilities; county & civic officials; newspaper reporters.
4.		Value or equity in business of $2-5,000; few if any employees.	Stenographer, bookkeeper, typist, mail clerks; ticket agent; auto, book, clothing, drygoods salesmen; govt. clerks; office employees.	

Note: Actors, authors, musicians, artists, etc. may be rated from "1" to "5" on the basis of reputation of their work, degree of acceptance, etc.

	PROFESSIONALS	PROPRIETORS	BUSINESSMEN	WHITE COLLAR WORKERS
5.		Value or equity $500-2,000; no employees.		Drugstore, hardware, grocery, five-and-dime clerks, telephone and beauty operators; dressmaker; practical nurse; etc.
6.		Less than $500 value or equity.		
7.				

1.			"Gentlemen farmers," landowners not directly supervising operation; the "patrons" of community activities.
2.			Landowners, operators, and managers of large properties with active urban life.
3.	Small contractor who works with his men.	Commercial pilot.	Owners and operators of good mechanized farms, with "hired hands."
4.	Construction, factory, or mine foreman; carpenter, plumber, electrician, master mechanics; RR engi-printer.	Police captain; butcher, tailor, dry cleaner; RR and Pullman conductors; "White collar men."	Small landowners and the "forgotten farmer" who owns a "decent place"; operators of good leased property employing hired help.
5.	Apprentice to skilled trades; timekeeper; RR fireman or brakeman; tel. lineman; medium-skilled factory workers.	Policemen, barber; gas station operator; butcher's apprentice; bartender; head waiter; laundry agent.	Tenants on good farms; owners of farms who just manage to eke out a living, some "by working out," others by working in plants, etc. to supplement income from crops.

	MANUAL WORKERS	SERVICE PERSONNEL	LANDOWNERS, FARMERS
6.	Semi-skilled factory and production workers; warehousemen; janitors; watchmen; cook (unless reputed)	Taxi and truck drivers; baggagemen, delivery men; gas stations attendants; waitresses.	Sharecroppers, established farm laborers; subsistence farmers who work at unskilled jobs, e.g., "cottagers."
7.	Laborers; unskilled miners & mill hands; section hands; migrant workers; scrub women; laundresses.	Domestic servant (but not butler or housekeeper); bus boys.	Migrant workers: unestablished and do not want to be; move with the seasons.
		Reputed lawbreakers	Unemployed; "no occupation."

APPENDIX C

TABLE 75. SIGNIFICANCE OF EFFICIENCY OF VARIABLES TO PREDICT PERSISTENCE N = 866

Observed	Predicted				Total
	Dropout		Persister		
	Obs	Exp	Obs	Exp	
Dropout	415	213.50	16	217.49	431
Persister	14	215.49	421	219.51	435
Total	429	429	437	437	866

Degrees of freedom: 1
Chi square value: 750.180 p<.001

TABLE 76. SIGNIFICANCE OF EFFICIENCY OF VARIABLES TO PREDICT PERSISTENCE: FEMALES N = 334

Observed	Predicted				Total
	Dropout		Persister		
	Obs	Exp	Obs	Exp	
Dropout	169	90.83	6	84.00	175
Persister	4	82.52	155	76.32	159
Total	173	173	161	161	334

Degrees of freedom: 1
Chi square value: 295.531 p<.001

APPENDIX C

TABLE 77. SIGNIFICANCE OF EFFICIENCY OF VARIABLES TO PREDICT PERSISTENCE: MALES N = 532

Observed	Predicted				Total
	Dropout		Persister		
	Obs	Exp	Obs	Exp	
Dropout	247	122.70	9	133.29	256
Persister	8	132.29	268	143.70	276
Total	255	255	277	277	532

Degrees of freedom: 1
Chi square value: 466.259 $p<.001$

TABLE 78. SIGNIFICANCE OF EFFICIENCY OF VARIABLES TO PREDICT PERSISTENCE: AGE SIXTEEN AND UNDER N = 151

Observed	Predicted				Total
	Dropout		Persister		
	Obs	Exp	Obs	Exp	
Dropout	125	106.81	3	21.19	128
Persister	1	19.19	22	3.81	23
Total	126	126	25	25	151

Degrees of freedom: 1
Chi Square value: 122.798 $p<.001$

APPENDIX C

TABLE 79. SIGNIFICANCE OF EFFICIENCY OF VARIABLES TO PREDICT PERSISTENCE: AGE SIXTEEN TO SEVENTEEN N = 242

Observed	Predicted				Total
	Dropout		Persister		
	Obs	Exp	Obs	Exp	
Dropout	146	90.51	3	58.49	149
Persister	1	56.49	92	36.51	93
Total	147	147	95	95	242

Degrees of freedom: 1
Chi square value: 225.580 $p < .001$

TABLE 80. SIGNIFICANCE OF EFFICIENCY OF VARIABLES TO PREDICT PERSISTENCE: AGE SEVENTEEN TO EIGHTEEN N = 334

Observed	Predicted				Total
	Dropout		Persister		
	Obs	Exp	Obs	Exp	
Dropout	99	31.76	3	70.24	102
Persister	5	72.24	227	159.76	232
Total	104	104	230	230	334

Degrees of freedom: 1
Chi square value: 297.635 $p < .001$

APPENDIX C

TABLE 81. SIGNIFICANCE OF EFFICIENCY OF VARIABLES TO PREDICT PERSISTENCE: AGE, EIGHTEEN AND OVER N = 132

Observed	Predicted				Total
	Dropout		Persister		
	Obs	Exp	Obs	Exp	
Dropout	44	15.68	1	29.32	45
Persister	2	30.32	85	56.68	87
Total	46	46	86	86	132

Degrees of freedom: 1

Chi square value: 119.130 $P < .001$

TABLE 82. SIGNIFICANCE OF EFFICIENCY OF VARIABLES TO PREDICT PERSISTENCE: FIRST QUARTILE N = 147

Observed	Predicted				Total
	Dropout		Persister		
	Obs	Exp	Obs	Exp	
Dropout	22	4.54	1	18.46	23
Persister	7	24.46	117	99.54	124
Total	29	29	118	118	147

Degrees of freedom: 1

Chi square value: 99.187 $p < .001$

APPENDIX C

TABLE 83. SIGNIFICANCE OF EFFICIENCY OF VARIABLES TO PREDICT PERSISTENCE: SECOND QUARTILE N = 451

Observed	Predicted				Total
	Dropout		Persister		
	Obs	Exp	Obs	Exp	
Dropout	155	115.23	77	116.77	232
Persister	69	108.77	150	110.23	219
Total	224	224	227	227	451

Degrees of freedom: 1

Chi square value: 56.160 $p < .001$

TABLE 84. SIGNIFICANCE OF EFFICIENCY OF VARIABLES TO PREDICT PERSISTENCE: THIRD QUARTILE N = 241

Observed	Predicted				Total
	Dropout		Persister		
	Obs	Exp	Obs	Exp	
Dropout	132	89.98	24	66.02	156
Persister	7	49.02	78	35.98	85
Total	139	139	102	102	241

Degrees of freedom: 1

Chi square value: 131.458 $p < .001$

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TABLE 85. SIGNIFICANCE OF EFFICIENCY OF VARIABLES TO PREDICT PERSISTENCE: BIRTH ORDER, SINGLE CHILD OR TWIN
N = 25

Observed	Predicted				Total
	Dropout		Persister		
	Obs	Exp	Obs	Exp	
Dropout	10	4.00	0	6.00	10
Persister	0	6.00	15	9.00	15
Total	10	10	15	15	25

Degrees of freedom: 1
Chi square value: 25.000 $p < .001$

TABLE 86. SIGNIFICANCE OF EFFICIENCY OF VARIABLES TO PREDICT PERSISTENCE: BIRTH ORDER, OLDEST CHILD N = 179

Observed	Predicted				Total
	Dropout		Persister		
	Obs	Exp	Obs	Exp	
Dropout	72	36.65	8	43.35	80
Persister	10	45.35	89	53.65	99
Total	82	82	97	97	179

Degrees of freedom: 1
Chi square value: 113.769 $p < .001$

APPENDIX C

TABLE 87. SIGNIFICANCE OF EFFICIENCY OF VARIABLES TO PREDICT PERSISTENCE: BIRTH ORDER, MIDDLE CHILD N = 230

Observed	Predicted				Total
	Dropout		Persister		
	Obs	Exp	Obs	Exp	
Dropout	90	62.50	35	62.50	125
Persister	25	52.50	80	52.50	105
Total	115	115	115	115	230

Degrees of freedom: 1
Chi square value: 153.009 $p < .001$

TABLE 88. SIGNIFICANCE OF EFFICIENCY OF VARIABLES TO PREDICT PERSISTENCE: BIRTH ORDER, YOUNGEST CHILD N = 182

Observed	Predicted				Total
	Dropout		Persister		
	Obs	Exp	Obs	Exp	
Dropout	64	29.57	5	39.43	69
Persister	14	48.43	99	64.57	113
Total	78	78	104	104	182

Degrees of freedom: 1
Chi square value: 112.988 $p < .001$

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TABLE 89. SIGNIFICANCE OF EFFICIENCY OF VARIABLES TO PREDICT PERSISTENCE: FATHER'S OCCUPATION, LEVELS ONE AND TWO N = 12

Observed	Predicted				Total
	Dropout		Persister		
	Obs	Exp	Obs	Exp	
Dropout	3	.75	0	2.25	3
Persister	0	2.25	9	6.75	9
Total	3	3	9	9	12

Degrees of freedom: 1
Chi square value: 12.000 $p < .001$

TABLE 90. SIGNIFICANCE OF EFFICIENCY OF VARIABLES TO PREDICT PERSISTENCE: FATHER'S OCCUPATION, LEVELS THREE AND FOUR N = 138

Observed	Predicted				Total
	Dropout		Persister		
	Obs	Exp	Obs	Exp	
Dropout	23	7.98	6	21.01	29
Persister	15	30.00	94	79.00	109
Total	38	38	100	100	138

Degrees of freedom: 1
Chi square value: 49.342 $p < .001$

APPENDIX C

TABLE 91. SIGNIFICANCE OF EFFICIENCY OF VARIABLES TO PREDICT PERSISTENCE: FATHER'S OCCUPATION, LEVELS FIVE AND SIX N = 338

Observed	Predicted				Total
	Dropout		Persister		
	Obs	Exp	Obs	Exp	
Dropout	143	91.40	42	93.60	185
Persister	24	75.60	129	77.40	153
Total	167	167	171	171	338

Degrees of freedom: 1
Chi square value: 127.196 $p < .001$

TABLE 92. SIGNIFICANCE OF EFFICIENCY OF VARIABLES TO PREDICT PERSISTENCE: FATHER'S OCCUPATION, LEVELS SEVEN AND EIGHT N = 185

Observed	Predicted				Total
	Dropout		Persister		
	Obs	Exp	Obs	Exp	
Dropout	67	44.11	29	51.89	96
Persister	18	40.89	71	48.11	89
Total	85	85	100	100	185

Degrees of freedom: 1
Chi square value: 45.680 $p < .001$

APPENDIX C

TABLE 93. SIGNIFICANCE OF EFFICIENCY OF VARIABLES TO PREDICT PERSISTENCE: TEACHER RATING--GETTING ALONG WITH OTHERS, FEMALE, #3 N = 107

Observed	Predicted				Total
	Dropout		Persister		
	Obs	Exp	Obs	Exp	
Dropout	72	49.12	1	23.88	73
Persister	0	22.88	34	11.12	34
Total	72	72	35	35	107

Degrees of freedom: 1
Chi square value: 102.536 p<.001

TABLE 94. SIGNIFICANCE OF EFFICIENCY OF VARIABLES TO PREDICT PERSISTENCE: TEACHER RATING--GETTING ALONG WITH OTHERS, MALE, #3 N = 246

Observed	Predicted				Total
	Dropout		Persister		
	Obs	Exp	Obs	Exp	
Dropout	120	67.63	11	63.37	131
Persister	7	59.37	108	55.63	115
Total	127	127	119	119	246

Degrees of freedom: 1
Chi square value: 179.328 p<.001

APPENDIX C

TABLE 95. SIGNIFICANCE OF EFFICIENCY OF VARIABLES TO PREDICT PERSISTENCE: GETTING ALONG WITH OTHERS, FEMALE, #4 N = 172

Observed	Predicted				Total
	Dropout		Persister		
	Obs	Exp	Obs	Exp	
Dropout	68	34.59	2	35.41	70
Persister	17	50.41	85	51.59	102
Total	85	85	87	87	172

Degrees of freedom: 1
Chi square value: 107.572 p ⟨.001

TABLE 96. SIGNIFICANCE OF EFFICIENCY OF VARIABLES TO PREDICT PERSISTENCE: TEACHER RATING--GETTING ALONG WITH OTHERS, MALE, #4 N = 203

Observed	Predicted				Total
	Dropout		Persister		
	Obs	Exp	Obs	Exp	
Dropout	60	24.13	2	37.87	62
Persister	19	54.87	122	86.13	141
Total	79	79	124	124	203

Degrees of freedom: 1
Chi square value: 127.579 p ⟨.001

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TABLE 97. SIGNIFICANCE OF EFFICIENCY OF VARIABLES TO PREDICT PERSISTENCE: TEACHER RATING--RESPONSIBILITY, #2 N = 137

Observed	Predicted				Total
	Dropout		Persister		
	Obs	Exp	Obs	Exp	
Dropout	118	103.36	2	16.64	120
Persister	0	14.64	17	2.36	17
Total	118	118	19	19	137

Degrees of freedom: 1
Chi square value: 120.411 $p \leq .001$

TABLE 98. SIGNIFICANCE OF EFFICIENCY OF VARIABLES TO PREDICT PERSISTENCE: TEACHER RATING--RESPONSIBILITY, #3 N = 489

Observed	Predicted				Total
	Dropout		Persister		
	Obs	Exp	Obs	Exp	
Dropout	169	72.80	31	127.20	200
Persister	9	105.20	280	183.80	289
Total	178	178	311	311	489

Degrees of freedom: 1
Chi square value: 338.196 $p \leq .001$

APPENDIX C

TABLE 99. SIGNIFICANCE OF EFFICIENCY OF VARIABLES TO PREDICT PERSISTENCE: TEACHER RATING--RESPONSIBILITY, #4 N = 150

Observed	Predicted				Total
	Dropout		Persister		
	Obs	Exp	Obs	Exp	
Dropout	33	14.04	6	24.96	39
Persister	21	39.96	90	71.04	111
Total	54	54	96	96	150

Degrees of freedom: 1
Chi square value: 54.062 $p < .001$

TABLE 100. SIGNIFICANCE OF EFFICIENCY OF VARIABLES TO PREDICT PERSISTENCE: TEACHER RATING--SELF-CONTROL, FEMALE, #3 N = 153

Observed	Predicted				Total
	Dropout		Persister		
	Obs	Exp	Obs	Exp	
Dropout	75	42.35	6	38.65	81
Persister	5	37.65	67	34.35	72
Total	80	80	73	73	153

Degrees of freedom: 1
Chi square value: 112.238 $p < .001$

APPENDIX C

TABLE 101. SIGNIFICANCE OF EFFICIENCY OF VARIABLES TO PREDICT PERSISTENCE: TEACHER RATING--SELF-CONTROL, MALE, #3 N = 317

Observed	Predicted				Total
	Dropout		Persister		
	Obs	Exp	Obs	Exp	
Dropout	127	59.18	13	80.82	140
Persister	7	74.82	170	102.18	177
Total	134	134	183	183	317

Degrees of freedom: 1
Chi square value: 240.841 $p < .001$

TABLE 102. SIGNIFICANCE OF EFFICIENCY OF VARIABLES TO PREDICT PERSISTENCE: TEACHER RATING--SELF-CONTROL, FEMALE, #4 N = 134

Observed	Predicted				Total
	Dropout		Persister		
	Obs	Exp	Obs	Exp	
Dropout	53	22.15	3	33.85	56
Persister	0	30.85	78	47.15	78
Total	53	53	81	81	134

Degrees of freedom: 1
Chi square value: 122.117 $p < .001$

APPENDIX C

TABLE 103. SIGNIFICANCE OF EFFICIENCY OF VARIABLES TO PREDICT PERSISTENCE: TEACHER RATING--SELF-CONTROL, MALE, #4 N = 123

Observed	Predicted				Total
	Dropout		Persister		
	Obs	Exp	Obs	Exp	
Dropout	39	13.32	0	25.68	39
Persister	3	28.68	81	55.32	84
Total	42	42	81	81	123

Degrees of freedom: 1
Chi square value: 110.103 $p < .001$

TABLE 104. SIGNIFICANCE OF EFFICIENCY OF VARIABLES TO PREDICT PERSISTENCE: TEACHER RATING--WORK HABITS, #2 N = 174

Observed	Predicted				Total
	Dropout		Persister		
	Obs	Exp	Obs	Exp	
Dropout	145	125.78	6	25.22	151
Persister	0	19.16	23	3.84	23
Total	145	145	29	29	174

Degrees of freedom: 1
Chi square value: 132.440 $p < .001$

APPENDIX C

TABLE 105. SIGNIFICANCE OF EFFICIENCY OF VARIABLES TO PREDICT PERSISTENCE: TEACHER RATING--WORK HABITS, #3
N = 484

Observed	Predicted				Total
	Dropout		Persister		
	Obs	Exp	Obs	Exp	
Dropout	138	56.21	41	122.79	179
Persister	14	95.78	291	209.21	305
Total	152	152	332	332	484

Degrees of freedom: 1
Chi square value: 275.264 p<.001

TABLE 106. SIGNIFICANCE OF EFFICIENCY OF VARIABLES TO PREDICT PERSISTENCE: TEACHER RATING--WORK HABITS, #4
N = 117

Observed	Predicted				Total
	Dropout		Persister		
	Obs	Exp	Obs	Exp	
Dropout	25	6.22	3	21.78	28
Persister	1	19.78	88	69.22	89
Total	26	26	91	91	117

Degrees of freedom: 1
Chi square value: 95.821 p<.001

APPENDIX C

TABLE 107. SIGNIFICANCE OF EFFICIENCY OF VARIABLES TO PREDICT PERSISTENCE: THROUGH CROSS-VALIDATION N = 269

Observed	Predicted				Total
	Dropout		Persister		
	Obs	Exp	Obs	Exp	
Dropout	124	71.79	12	64.21	136
Persister	18	70.21	115	62.79	133
Total	142	142	127	127	269

Degrees of freedom: 1
Chi square value: 162.660 $p < .001$

TABLE 108. SIGNIFICANCE OF EFFICIENCY OF VARIABLES TO PREDICT PERSISTENCE: THROUGH CROSS-VALIDATION, FEMALES N = 109

Observed	Predicted				Total
	Dropout		Persister		
	Obs	Exp	Obs	Exp	
Dropout	14	11.91	45	47.09	59
Persister	8	10.09	42	39.91	50
Total	22	22	87	87	109

Degrees of freedom: 1
Chi square value: 1.006 $P < .50$

APPENDIX C

TABLE 109. SIGNIFICANCE OF EFFICIENCY OF VARIABLES TO PREDICT PERSISTENCE: THROUGH CROSS-VALIDATION, MALES
N = 160

Observed	Predicted				Total
	Dropout		Persister		
	Obs	Exp	Obs	Exp	
Dropout	77	42.83	0	34.17	77
Persister	12	46.17	71	36.83	83
Total	89	89	71	71	160

Degrees of freedom: 1
Chi square value: 118.422 $p < .001$